Nebraska GIS Steering Committee

Building a Spatial Data Infrastructure for Nebraska – November 2002

Coordinating the Development and Sharing of GIS Technology and Geospatial Data Among State, Local and Federal Agencies and the Private Sector in Nebraska

— An Annual Report and Nebraska I-Team Strategic Plan

NEBRASKA GEOGRAPHIC INFORMATION SYSTEMS
STEERING COMMITTEE

BUILDING A SPATIAL DATA INFRASTRUCTURE FOR NEBRASKA

An Annual Report and Nebraska I-Team Strategic Plan

November 2002

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— An Executive Summary —

An Annual Report and Nebraska I-Team Strategic Plan. The Nebraska GIS Steering Committee is required by state statutes to submit an Annual Report on its activities to the Governor, the Legislature, and the Nebraska Information Technology Commission. For the last couple years, the Steering Committee has woven into this Annual Report process the development and/or updating of a GIS strategic plan for Nebraska.

In the summer of 2001, the US Office of Management and Budget (OMB) and the Federal Geographic Data Committee (FGDC) jointly approached state GIS coordinating bodies and asked for their support and leadership in a process known as Implementation-Teams (I-Teams). The goal of this I-Team process is to develop detailed, state-by-state plans for the coordinated development, maintenance, and distribution of the widely needed geospatial data through a process involving input from federal, state, and local agencies and private entities. Because this I-Team concept so closely paralleled the GIS Steering Committee's overall approach, the Steering Committee indicated its willingness to undertake the I-Team leadership for Nebraska. In addition to providing an Annual Report and Strategic Plan for the GIS Steering Committee, this report is also designed to outline an I-Team Plan for the geographic area of Nebraska.

Follow-up on 2001 GIS Strategic Plan. Because the I-Team concept closely paralleled the GIS Steering Committee's existing planning approach, last year's Nebraska GIS Annual Report and Strategic Plan provided a starting point for this year's GIS/geospatial data planning. As a consequence, this year's Annual Report and I-Team Strategic Plan is organized around providing an update on the goals, objectives and projects outlined in the 2001 Annual Report and Strategic Plan, while also incorporating new needs and initiatives identified as part of the I-Team planning process.

Strategic Direction. The strategic focus of the GIS Steering Committee's efforts over the last year, and its future direction are reflective of its mission statement and the seven long-range goals outlined in its 2001 Strategic Plan. The Nebraska I-Team planning process reaffirmed the strategic direction outlined in these Steering Committee long-range goals and mission statement:

> *The mission of the Nebraska Geographic Information System Steering Committee is to encourage the appropriate utilization of GIS technology and to assist organizations to make public investments in GIS technology and geospatial data in an effective, efficient, and coordinated manner.*

This Annual Report and I-Team Strategic Plan provides an update on the status of each of the seven long-range goals and the related activities and provide a blueprint for future collaborative efforts directed towards realizing those goals. Some of those activities are highlighted below.

Priority Geospatial Data Development. A project to develop a standardized, updated, high-resolution database of Nebraska surface water features (National Hydrography Dataset) has progressed from the pilot project phase to sustained production and the NHD has been developed for several watershed basins. This statewide data development effort is a collaborative effort involving the Department of Natural Resources, Department of Environmental Quality, Conservation and Survey Division–UNL, and US Geological Survey.

The Department of Natural Resources has completed the third year of a multi-year cooperative agreement with the USGS to develop revised, statewide digital surface elevation data and digital ortho-imagery. The DEMs (elevation data) are nearing statewide completion and statewide completion of the DOQs (imagery) is expected in June 2004.

The Department of Roads is nearing completion of its efforts to bring the all the local road vectors into its statewide transportation database. At this point most of those local roads do not have intelligence (attributes) attached to the vectors. The agency is now in a planning process to determine how to best work with local entities to populate these local roads with a common system of identifiers and other intelligence and develop a system for on-going data exchange.

In an agricultural state like Nebraska, soils data is needed for a wide range of applications. Three agencies (USDA-Natural Resources Conservation Service, Conservation and Survey Division-UNL, and the Nebraska Department of Natural Resources) have completed 4 ½ years of a five-year effort to convert paper-based county soil survey maps and data into a standardized digital geospatial product. Statewide completion of this dataset is expected by June 2003.

Non-Data Spatial Infrastructure Initiatives. In the aftermath of the September 11, 2001 terrorist attack, the GIS Steering Committee added a strategic goal to assist public safety agencies in utilizing GIS technology. Initial efforts were focused on short-term assistance to help the Nebraska Emergency Management Agency (NEMA) to get up and running with GIS. Since then, the Steering Committee has begun a process of working with NEMA and the Bio-terrorism program of the Health and Human Services System to look at the longer-term requirements to more fully bring the power of GIS to bear on the important area of Homeland Security. The appendix of this report, include an initial set of findings and recommendations related to this longer-term goal.

Land record modernization is another of the priority long-term strategic goals of the Steering Committee. One the biggest hurdles that this initiative must overcome is the lack of a policy consensus around structures for how state, local, regional and federal entities might cooperate to sustain such an effort. This past year, the Steering Committee has worked with several of the key agencies and constituencies to secure funding, through a cooperative agreement with USGS, for a Land Record Modernization Study. With this funding, a consulting firm has been hired to help the Steering Committee conduct a Land Record Modernization Study. That study is currently underway, with an expected completion date of June 2003. As part of the study, the current status of local government land record management will be assessed and other states will be reviewed for successful models of state/local land records cooperation. Based on this background information, a collaborative process will then be undertaken to involve key state agencies and local government representatives in an effort to define a common vision of how state and local governments might cooperate to support land record modernization.

Enhancing the state's ability to share and distribute geospatial data is another goal, which received extensive focus this past year. An Advisory Committee examined the range of issues and needs involved and issued a report outlining a series of recommendations. That report (included in the appendix of this Annual Report) recommended the development of an enhanced, enterprise-wide geospatial data center to be hosted by the Department of Natural Resources. Recognizing the current budget problems in state government, the report included both interim recommendations that might be undertaken with little additional resources and also longer-term recommendations related to a range of services that should be developed in conjunction with this enterprise-wide data center as the resources become available.

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Nebraska GIS Steering Committee

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Nebraska Geographic Information Systems Steering Committee

INTRODUCTION

The Nebraska Geographic Information System Steering Committee was established by the Legislature in 1991 *(Reissued Revised Statutes of Nebraska, 1943, §81-2601 through §81-2605),* in an effort to coordinate the implementation of GIS technology by public entities in Nebraska. Geographic Information Systems (GIS) is a powerful information technology that has numerous applications in both the public and private sectors. The Steering Committee's role is to see that public investment in GIS technology is achieved in a coordinated, efficient manner.

The GIS Steering Committee is an intergovernmental coordinating body with representatives from state, local, regional and federal public entities. The Steering Committee's work is supported by a Coordinator provided through the Information Management Services Division of the Nebraska Department of Administrative Services.

As required by statute, the GIS Steering Committee produces an Annual Report that is submitted to the Governor, the Clerk of the Legislature, the Nebraska Intergovernmental Data Communications Advisory Council, and Nebraska's Chief Information Officer.

Nebraska I-Team Plan. In the summer of 2001, the US Office of Management and Budget (OMB) and the Federal Geographic Data Committee (FGDC) jointly approached state GIS coordinating bodies and asked for their support and leadership in a process known as Implementation-Teams (I-Teams). The goal of this I-Team process is to develop detailed, state-by-state plans for the coordinated development, maintenance, and distribution of the widely needed geospatial data through a process involving input from federal, state, and local agencies and private entities. Because this I-Team concept so closely paralleled the GIS Steering Committee's overall approach, the Steering Committee indicated its willingness to undertake the I-Team leadership for Nebraska. In addition to providing an Annual Report and Strategic Plan for the Nebraska GIS Steering Committee, this report is also designed to outline an I-Team Plan for geographic area of Nebraska.

Some of the changes in the format of this report reflect an effort to follow the rough national model that has evolved for these I-Team plans (i.e., data standards and sources, anticipated costs and gaps in funding, and data stewards). Many of these new pieces of information may seem rather extraneous for the other purposes of this Annual Report, but they provide useful information for other agencies and entities considering how they might become partners and support these current and/or anticipated GIS-related efforts. Because the Steering Committee has not requested some of this information from its participating agencies in the past, it is

important to note that some of this new information is only a rough approximation provided by these agencies for the purposes of this report only.

REPORT BACKGROUND

Geographic information is a significant subset of the information explosion that has occurred over the last two decades. In the broadest sense, geographic information is information that includes a spatial reference (street address, latitude/longitude, section/township) as part of the data and is generically referred to as *geospatial or spatial data*.

The geographic component of information has become increasingly important as information technologies, such as Geographic Information Systems (GIS), have been developed to analyze and display information based on its location. Location or place is an important aspect of most data collected and used by public agencies. GIS was initially developed primarily for use in the area of natural resources management. However, as the software's capabilities and the understanding of the technology has grown, the use of GIS has now expanded to include a wide and rapidly growing range of applications (assessment, economic development, transportation planning, public safety, emergency response, etc.). Because of the powerful capabilities of GIS and other geospatial technologies, many public agencies (state, local and federal) are making investments in the technology and more will do so in the future.

What is Spatial Data Infrastructure? Many GIS experts suggest that 80 to 90% of GIS implementation costs are commonly related to geospatial data development or acquisition. Fortunately, one of the more powerful features of GIS is its capability to facilitate the sharing and integration of data from a wide variety of data themes and sources. Past experience has taught public agencies the importance of coordination in making investments in information technology infrastructure. Public agencies have learned that through coordination they can aggregate demand and avoid the costly development of duplicate, non-compatible, computer and communication networks. As our understanding of GIS technology costs and requirements has matured, there is also a growing appreciation of the importance of coordination in the development of a common *spatial data infrastructure,* as a way to avoid the costly development of duplicate, non-compatible spatial data.

To take maximum advantage of the GIS capability to share and integrate data, and to secure the maximum return from public investments in geospatial data, it is important that public investments in geospatial data are coordinated across all levels and types of public agencies. State coordinating bodies, like the Nebraska GIS Steering Committee, are evolving to play a pivotal role in a loosely coordinated state, federal and local effort to build a common *National Spatial Data Infrastructure (NSDI).* The purpose of this plan is to identify those key components and initiatives that are critical to the pursuit of a coordinated GIS development strategy and the development a common *Spatial Data Infrastructure for Nebraska.*

The Homeland Security initiatives, launched in the wake of the September 11th terrorist attacks, have served to highlight the importance of coordinated NSDI development. The events in New York graphically illustrated the importance of having accurate, current geospatial data readily accessible in times of an emergency. In response to the September 11th events, the GIS Steering Committee has worked with the Nebraska Emergency Management Agency (NEMA) to identify what geospatial data was currently available to meet its short-term needs and is currently working with NEMA to identify and develop plans to meet its long-term GIS-related needs.

Nebraska I-Team Structure and Process. A high degree of overlap exists between the goals, objectives, and processes envisioned for the I-Team concept and those of the existing Nebraska GIS Steering Committee. To avoid duplication of effort and the waste of time and energy to "re-invent the wheel", it was decided to build the Nebraska I-Team planning effort around the existing coordination structures and processes of the Nebraska GIS Steering Committee.

After consulting with the broader Nebraska GIS user community, the Nebraska I-Team and the Nebraska GIS Steering Committee adopted the following procedures for Nebraska I-Team planning in September 2001.

On-going Coordination. The Nebraska GIS Steering Committee (with its statutorily-defined representation from state, local, federal other public agencies) will continue to serve as the primary, on-going, intergovernmental coordinating body for Nebraska I-Team and other GIS and geospatial data coordination efforts in Nebraska. Representatives of state, local, federal, tribal agencies not formally represented on the Nebraska GIS Steering Committee will be welcome to participate in those bimonthly meetings on a non-voting basis.

Building a Broader Venue for Coordination. Efforts will be made to also build a broader venue for Nebraska geospatial data coordination by convening semi-annual Nebraska I-Team meetings. Representatives of all interested parties (state, local, federal agencies, tribal and private entities) are invited to participate. Participants will be encouraged to share their geospatial data needs, development plans, opportunities for partnerships, and possible available resources with an overall focus on updating evolving collaborative plans for the development, maintenance and distribution of Nebraska geospatial data. The Nebraska GIS Steering Committee will be responsible for organizing and convening these semi-annual meetings. The initial Nebraska I-Team meeting of this broader GIS user community was held in September 2001 with a program focus of "Federal Agencies and Nebraska GIS Data ". Since that initial broader community meeting, two additional Nebraska I-Team meetings of the broader GIS user community have been held. Those meetings provided critical input into the priorities outlined in this report, as well as reviewing and providing feedback on the draft report.

Database Advisory Committees. Existing Advisory Committees (Water Resources, DOQs/DEMs, Transportation, Governmental Boundaries, Land Use and Land Cover, Land Record Modernization, Multipurpose Land Information Systems Standards, Interactive Internet Mapping, and Facilitating Geospatial Data Sharing) authorized by the Nebraska GIS Steering Committee, will continue to serve as the primary interagency coordinating bodies for specific databases. Other interested entities, public and/or private, not currently represented on these Advisory Committees will be welcome to participate in these Advisory Committee meetings and planning sessions. In those instances when it is deemed desirable to define specific voting membership on a particular Database Advisory Committee, this will be the responsibility of the Nebraska GIS Steering Committee Chairperson. In those cases where an Advisory Committee has become dormant and there is a felt need for additional coordinated planning in relationship to these datasets, the Nebraska GIS Steering Committee will act to reconvene or reconstitute that Database Advisory Committee.

STRATEGIC DIRECTION

In the year 2000 the Nebraska GIS Steering Committee published a Strategic Plan and Annual Report that outlined its mission and six long-range goals or strategic initiatives that would serve as guides in *Building a Spatial Data Infrastructure for Nebraska*. In aftermath of the September 11th terrorist attacks, the Steering Committee added a new strategic initiative related to assisting in the application of GIS technology to Homeland Security initiatives when it updated its Strategic Plan in 2001. Since then, the Nebraska I-Team community has affirmed those seven strategic initiatives and this report provides an update on the status and plans related to those seven initiatives.

NEBRASKA GIS STEERING COMMITTEE MISSION

The Nebraska GIS Steering Committee has defined a mission statement to serve as a guide for its work and the merits of this strategic guide was reaffirmed by the Nebraska I-Team review.

The mission of the Nebraska Geographic Information System Steering Committee is to encourage the appropriate utilization of GIS technology and to assist organizations to make public investments in GIS technology and geospatial data in an effective, efficient, and coordinated manner.

LONG-RANGE GOALS AND/OR STRATEGIC INITIATIVES

Within the context of the Steering Committee's mission statement and its strategic planning process and that of the broader Nebraska I-Team user community, the GIS Steering Committee and the I-Team have reaffirmed the following long-term goals for coordinated GIS development.

Priority Database Development*. Coordinate the development of widely-needed digital geospatial databases in a standard reference format and establish systems for the on-going cooperative maintenance and enhancement of these priority geospatial databases.*

A core subset of geospatial databases (roads, streams, governmental boundaries, aerial photography, etc.) are needed by a wide range of state, local and federal government agencies and private entities. The cooperative development and maintenance of these core databases is the most cost-effective means of providing these databases. These core databases also provide the framework for the development of numerous other geospatial databases. The cooperative development of standardized framework databases will minimized costly duplication of effort, facilitate data sharing and minimize costly data integration problems due to incompatible data.

GIS and Homeland Security*. Continue to assist, as requested, the Nebraska Emergency Management Agency and other emergency and public safety agencies in planning for short and long-term GIS and geospatial data requirements to support Homeland Security and other public safety initiatives.*

Timely, accurate information, easily accessed and capable of being shared across federal, state, and local political jurisdictions is fundamental to strengthening the decision-making capability of those tasked with the homeland security mission. It is estimated that geographic location is a key component of approximately 80-90% of all government data. Geospatial information technology utilizes the locational component of data to provide the capability to quickly visualize activity

patterns, map locations, and understand the multi-layered geospatial context of emergency situations.

The GIS Steering Committee has long seen the tremendous potential of GIS technology for emergency preparedness and response applications. In the aftermath of the September 11th attacks, it has become clearer that in emergency situations of whatever origin, our nation and/or state is dependent on rapid access to and application of many types of current, accurate geospatial information. Given the nature of the geospatial data needed for these applications, it is also clear that interagency collaboration and coordination are keys to realizing that potential.

Land Records Modernization. *Promote and facilitate local government land record modernization and GIS development.*

One of the most promising and cost-effective application areas of GIS technology is the modernization of how local government land records are maintained and accessed. In addition to land record modernization, there are numerous other potential local government applications of GIS technology (emergency response, public health and safety, zoning, taxation, street and utility maintenance, etc.) The land record information maintained by local governments is also one of the framework geospatial databases that are needed by a wide variety of state, local and federal agencies and private entities. It is in the interest of the broader GIS community that this land record information be developed in a standardized geospatial format that is accessible to multiple users at the local, state and federal level. Because of the limited resources at the local government level, partnerships will be necessary in many areas to facilitate the development and maintenance of this data.

Data Sharing and Distribution. *Develop structures, standards, and processes that facilitate easy access to, integration, and usability of publicly available geospatial data.*

A key component of any coordinated GIS development strategy must be the development and maintenance of mechanisms to facilitate the sharing of commonly needed geospatial data. There are several essential elements to such a data sharing strategy. These include the easy ability to discover the existence of data and how it is accessed. The documentation of the data to facilitate its proper use is another essential element, as is the establishment and wide implementation of data standards to facilitate data integration. Geospatial data users and types of data are diverse and data sharing strategies must address this diversity of users and needed data (natural resources, demographics, land records, transportation, utilities, city/regional/state/federal, etc.).

Technical Assistance*. Provide technical assistance to local governments and state agencies.*

With the growing interest in GIS technology, it is no longer just being used by a limited number of fairly large public agencies. It is becoming a powerful mainstream information technology, with a wide variety of state and local level agencies either developing or having an interest in developing GIS applications. With this growing interest in the technology, there is a parallel growing need for technical assistance to help these agencies develop their GIS/geospatial data or applications. These technical assistance needs range from guidance in designing and planning the development of an in-house capability; to specialized GIS application development; to large-scale geospatial data development projects; to on-going development and maintenance of specific GIS applications. Up to this point, the primary operational model in Nebraska has been for each agency or local government to develop and maintain its own in-house GIS capability. With more and more agencies expressing interest in the technology, it is time to consider the

merits and efficiencies that might be gained by arrangements to aggregate the demand and resources available to support these technical services.

Education/Outreach. *Promote an educational outreach program designed to maximize the overall return on public investments in the development of geographically referenced databases and GIS systems by providing educational materials, presentations and coordination services to the public officials and technical staff who will be making these investment decisions.*

While GIS can no longer be considered a new technology, it is still new and relatively complex for many of the agencies and policy makers who are now considering their initial public investments in the technology. Without education and/or technical assistance these public sector decision-makers can easily make costly mistakes in their initial GIS investment decisions. The risks of costly mistakes have less to do with the hardware and software, and more with data purchase or development decisions. Public investments in a GIS educational/outreach program, directed toward government decision-makers, will increase the probability of wise public investment decisions in GIS technology. Such an education program will increase the likelihood that costly geospatial databases developed for one area and application will not only work as intended for that application, but also for other areas and applications. Such an education/outreach program is a vital component of a coordinated GIS development effort.

Strengthen Coordination Capacity. *Strengthen the GIS Steering Committee's capacity to facilitate the implementation of priority geospatial database development decisions, data sharing, interagency/intergovernmental partnerships, and agencies' utilization of GIS technology.*

While Nebraska statutes define broad areas of responsibilities for the Nebraska GIS Steering Committee, the Committee has very little in the way of independent authority and/or resources to seriously address those responsibilities. With limited authority and no operational capability or budget, Steering Committee decisions and priorities can only be implemented through the sponsorship and active support of independent state, local or federal agencies. The coordination of GIS development for the overall good of the broad and growing Nebraska GIS user community is a unique and challenging mission not specifically shared by any other public entity. In some specific instances other agencies' missions and priorities are congruent with those of the Steering Committee, and in those cases those agencies may take the lead on a project on behalf of the Steering Committee. However, where this parallel sense of priorities does not exist, the Steering Committee is seriously limited in its ability to implement its priorities. Many of today's major geospatial data development efforts are only feasible through intergovernmental partnerships. The Steering Committee's structure is poorly suited to facilitating the actual implementation of those partnership projects. The availability of seed funding specifically dedicated to collaborative GIS development efforts and the ready access to institutional channels whereby the resources from intergovernmental partners could be efficiently combined and leveraged would enhance the Steering Committee's ability implement collaborative GIS development projects.

DATA DEVELOPMENT GOALS AND INITIATIVES

One of the primary foci of National Spatial Data Infrastructure (NSDI) development is the development and maintenance of a core set of geospatial databases that are used in a wide variety of GIS/geospatial data applications. This report provides, for each prioritized database, an explanation for why it is a priority, an assessment of its current status, and an overview of anticipated future directions and issues.

PRIORITY DATABASE DEVELOPMENT AND MAINTENANCE. *Coordinate the development of widely needed digital geospatial databases in a standard reference format and establish systems for the on-going cooperative maintenance and enhancement of these priority geospatial databases.*

A core subset of geospatial databases is needed by a wide range of state, local and federal government agencies and private entities. The cooperative development and maintenance of these core databases is the most cost-effective means of providing these databases. These core databases also provide the framework for the development of numerous other geospatial databases. The cooperative development of standardized framework databases will minimized costly duplication of effort, facilitate data sharing and minimize costly data integration problems due to incompatible data.

A set of seven data layers or themes have been identified nationally as priorities for coordinated nationwide development:

Hydrography	Ortho-aerial imagery	Surface Elevation
Cadastral	Transportation	Administrative Boundaries
Geodetic Control		

Collectively, these data themes are referred to as the "Framework" data layers because of the role they play in providing an underlying data framework for a very broad array of GIS applications. Because of the importance of these data layers, the Nebraska GIS Steering Committee has also prioritized their statewide development and maintenance. In addition to these framework data themes, the Nebraska GIS Steering Committee has also prioritized for statewide development three other data themes due to their specific importance to Nebraska:

Groundwater Wells	Soil Surveys	Street Addresses

FRAMEWORK LAYERS

Theme: Hydrography

Why it is a Priority. Geospatial databases that accurately map and provide core descriptive attribute information on surface water features have been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee because they are among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. The Nebraska 2000 Annual Report and Strategic Plan provided extensive background information and rationale about the needs for and importance of this geospatial database.

Because of the importance of surface water to Nebraska, numerous state, local and federal agencies collect, analyze, and use data related to surface water features (rivers, streams, canals, lakes, wetlands, etc.). It was noted in the Nebraska 2000 Strategic Plan that there was no statewide, digital, surface water features geospatial database available that was sufficiently comprehensive, current, and at a scale of spatial accuracy and detail to serve as a standard reference database for these wide-ranging applications.

Current Status. The primary statewide geospatial hydrographic database that currently exists for Nebraska is a 1:24,000 scale database created in the early 1990s by the Nebraska Dept. of Natural Resources (NDNR). This database was digitized from 7-1/2 min. USGS paper quad maps and only the primary stream for each watershed basin was collected. Only limited attribute data is available. Also available are a limited number of 1:24,000 DLGs for relatively small areas of the state. Also available statewide is a 1:100,000 scale National Hydrographic Dataset (NHD) developed for Nebraska and the rest of the county as part of a joint effort by USGS and EPA. The NHD database model includes several special features to enhance its ability to serve as a surface water feature database for a wide variety of applications. The NHD developed by USGS/EPA is based on non-updated, hydrographic line work from USGS 1:100,000 scale maps.

In 1999, the Nebraska GIS Steering Committee adopted as a priority the development of an updated, 1:24,000-scale hydrographic dataset based upon the standards for high-resolution NHD. This decision was based upon the recommendations of an intergovernmental Water Resources Database Advisory Committee formed in late 1998 to study and make recommendations on water-related geospatial databases. Since that time, an initial 1:24,000 NHD pilot project has been completed for one watershed area and 1:24,000 NHD datasets have been completed, or are near completion, for seven other watershed areas (8-digit HUCs - Hydrologic Catalog Units). These eight catalog units are contiguous watershed areas located in and around the lower Platte River basin in eastern Nebraska. There are approximately 70 HUC (8-digit) watershed areas in, or partially in Nebraska. The next focus of this interagency effort will be NHD development for the Big and Little Blue River Basins, in southeastern Nebraska.

This project has been an interagency effort from the beginning. The Nebraska Department of Natural Resources (NDNR) is the lead state agency, with a work share agreement with the US Geological Survey. Under this work share agreement, NDNR is responsible for in-house creation of the updated stream vectors and USGS is responsible for conflating the attributes, quality control, and providing training and technical assistance. Also assisting in this project is the Conservation and Survey Division - University of Nebraska-Lincoln, and local Natural Resources Districts. Start up funding has been contributed by the Nebraska Information Technology Commission, the Nebraska Dept. of Roads, local Natural Resources Districts and the Nebraska Dept. of Environmental Quality. After the initial startup funding, the project has been primarily funded by NDNR in-kind staff contributions and by grants from NDEQ's Section 106 Fund. Grant funding is also expected from NDEQ's 319 Non-point source funds.

Source: Hydrographic line work is digitized from 1993 and/or 1999 1:12,000-scale DOQs. Attributes are conflated from 1:100,000 NHD and corrected based on local knowledge of stream networks.

Standards: Standards for high-resolution National Hydrographic Dataset, http://mapping.usgs.gov/standards/

Estimate total investments in this Theme: Not available at this time.

Contribution by Sector

Estimate of Current State Contributions: approximately $350,000 (cash and in-kind, both expended and budgeted)

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: None

What is needed? A sustained partnership of federal, state, and local agencies is needed to provide the resources necessary to complete this high-resolution NHD statewide in a timely and efficient manner. As this project has matured, four key agencies have stepped forward to provide most of the resources. NDNR is providing technical and management oversight and office space on an in-kind basis. USGS is providing training, software tools, attribute conflation, and quality control on an in-kind work share basis. NDEQ has provided $50,000 in grant funding, which is used primarily to pay for student digitizers and NDEQ has indicated a "highly likely" willingness to provide additional $100,000 in grant funding for the project in the near future. Contract agreement discussions on those funds are underway. NDEQ has also indicated at least the significant potential of providing an additional $100,000 after that. The Conservation and Survey Division – University of Nebraska is helping to recruit and provide students who are paid on a part-time basis to do the actual digitizing. Any significant changes in the commitment or resources available from any of these four agencies could dramatically impact this project. At this point, the most obvious gap is approximately $150,000 in cash commitments beyond what NDEQ has currently indicated is "highly likely" to be available in the near future. However, NDEQ as noted has indicated at least the significant potential of being able to provide $100,000 of that amount.

What is the likely source? A continued I-Team partnership of federal, state, and local agencies will be the key to completing this project.

Estimate total investments needed to complete this theme: Using USGS original cost estimates, it would have cost approximately five million dollars to contract with private vendors to digitize a comprehensive set of updated digital maps of the rivers and streams for Nebraska. Added to these mapping costs, would have been the costs associated with incorporating into the database the special attribute features of the NHD, which is what makes it such a powerful multi-purpose standard-reference database. The USGS-based rough estimate for these costs was approximately $700,000.

Based on the Nebraska project experience so far, it appears that the statewide digitizing can be completed for approximately $600,000 (cash and in-kind) as opposed to the original USGS private vendor estimate of $5,000,000. This is dramatic reduction is possible by leveraging the in-house technical expertise available at NDNR, the use of student digitizers, and the technical support from USGS. The $600,000 does not include USGS in-kind contributions. As part of the work share agreement with USGS, the costs for conducting the conflation of NHD attributes and the quality control is being provide as in-kind services by USGS. All four of the current key agencies (NDNR, NDEQ, CSD-UNL, and USGS) have indicated likely future commitments to this project (in-kind and cash). The current total of expended, obligated, and "likely" future commitments to this project from state agencies is approximately $350,000. There is currently an unfunded gap of approximately $150,000 in

the cash funding needed to pay the estimated costs for student digitizers to complete statewide digitizing.

Estimate the current allocation of funding include current state and local contributions (Budgeted: $350,000; Needed: $600,000; Gap: $150,000 cash and $100,000 in-kind) Assumes in the "Budgeted" category an additional $100,000 from the NDEQ 319 funds for which there is an oral "highly likely" commitment, but not yet a signed agreement. The in-kind gap of $100,000 is most likely to be provided by NDNR staff and therefore is likely to be available. These figures do not include the USGS in-kind work share contributions.

Describe possible ways to overcome this gap: The current anticipated cash-funding shortfall of approximately $150,000 could possibly be met by additional NDEQ funds in the future. However, the completion of this major statewide database development project could be ensured and possibly expedited if two or three other agencies could find additional resources to jointly fund this shortfall over the next 2-3 years. Among the other agencies with significant interest in this dataset and which therefore could be possible sources to contribute to this interagency funding include the following: Nebraska Department of Roads, Nebraska Game and Parks Commission, Nebraska Department of Agriculture, Nebraska Emergency Management Agency, Federal Emergency Management Agency, and the Natural Resources Conservation Services – USDA.

Most appropriate data steward: Nebraska Department of Natural Resources

Maintenance: Not available

Estimate maintenance cost: Not available

Theme: Digital Ortho Photography

Why it is a Priority. The Nebraska GIS Steering Committee and the Federal Geographic Data Committee have identified geo-referenced aerial photography as a high priority for development. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

Orthoimagery refers to aerial photography that has been geo-referenced and corrected for errors due to camera angle and terrain displacement. Orthoimagery is used as a base map for a wide variety of GIS and geospatial analyses. Because all of the points on orthophotos are geo-referenced, it can be used to collect the shape and approximate locational coordinates of any surface feature that can be seen in the photo. This characteristic of orthophotos makes them a very cost-effective means for deriving other needed geospatial databases. Orthoimagery also provides a valuable visual backdrop for many abstract GIS maps and analyses and as such provide an important real world context for an abstract map.

Current Status. As a result of an earlier workshare agreement between the Nebraska Department of Natural Resources (NDNR) and the USGS, a statewide dataset of 1:12,000 scale digital orthophoto quadrangles (DOQs) was completed in early 1999 (source imagery 1993). These digital statewide orthophotos are now available from the Nebraska Department of Natural Resources (NDNR) at very limited or no cost.

In 1999, several federal agencies cooperated in contracting for statewide flights to collect new aerial photography for the geographic area of Nebraska. For some areas of the state, there were significant changes between 1993 and 1999. In response to a wide need for more recent geo-referenced aerial photography, the Nebraska GIS Steering Committee authorized the formation of an interagency Advisory Committee on Orthoimagery and Elevation Databases to study the related issues and make recommendations. Based on the results of a Lancaster County pilot project conducted by NDNR, the Advisory Committee recommended statewide development of revised DOQs, based on new 1999 source imagery and 10-meter DEMs and projected in both UTM and State Plane Coordinates. The GIS Steering Committee endorsed these recommendations.

The NDNR and the USGS have entered into a three-year workshare agreement that calls for the completion of statewide, revised DOQs based on 1999 NAPP imagery and 10-meter DEMs. At the time of this report, approximately 45 counties in southern and central Nebraska are completed and certified, 6 counties are completed and awaiting certification, and another 12 partial counties are in process. At the time of this report, this project is on track for completion of statewide DOQ coverage by June 30, 2004. Completion is, of course, contingent upon continued funding and support for this project at approximately the current levels, and timelines, at both NDNR and USGS.

DOQs at a higher level of resolution are also available for the urban areas around the state's two population centers: Omaha, and Lincoln. The City of Omaha initially developed DOQs in 1993 at 1/4-meter resolution for the eastern 2/3 of Douglas County. Then 1998 imagery was used to develop updated DOQs at the 1/8-meter and 1/4-meter resolution for the developed and non-developed areas of Douglas County respectively. More recently, a regional consortium developed 1/4 and 1/2-meter DOQs based on 2001 imagery for all of Douglas and Sarpy Counties and some of Washington and Pottawattamie, IA Counties. Partners are currently being sought for a future regional effort to acquire updated 1/8 and 1/4-meter DOQs in 2004. Access to these higher level DOQs is available only through specific arrangements with the local partners. A local point of contact for access to existing DOQs and for future regional acquisition efforts is Scott McIntyre, City of Omaha Public Works, 404-444-5100, smcintyre@ci.omaha.ne.us.

In 1997, the City of Lincoln and Lancaster County acquired 1-foot resolution, black and white, digital orthophotography that covered 296 sections in and around Lincoln. Updated 1-foot resolution aerial photography was acquired in 1999 to update 50 sections in rapidly changing areas in and around Lincoln and used to generate 1"=200' (1:2,400) digital orthophotography. The 1997 photography project also generated a digital terrain model (DTM) from which 2-foot contours were derived. This DTM was also used in the rectification process of the orthophotography acquired in the 1999 update. Updated 1-foot color orthophotography based on 2002 imagery for the Lincoln, Lancaster County area is currently under development by the USGS as part of an urban areas Homeland Security initiative. The USGS developed DOQs will be publicly available based on standard USGS distribution policy and procedures. Access to the 1997 and 1999 DOQs is available only through specific arrangements with the City of Lincoln Public Works and Utilities Dept.

The Nebraska State Office of the Farm Service Agency – USDA (FSA) is also acquiring other imagery data that will undoubtedly be helpful to some users. This data is natural-color, aerial imagery collected (as part of a pilot project) in both 2001 and 2002 for a block of counties in southeast Nebraska. The imagery was collected during leaf-on periods and orthorectified to mosaicked DOQs and has a 2.0-meter pixel resolution. Each year this

imagery has been processed a little differently, depending in part on available resources. The imagery is unlicensed and is available through the FSA or the NDNR Databank website. For 2003, FSA has indicated that they expect to fly the entire state. FSA has also indicated that they are interested in talking with other agencies and individuals to see what might be possible in terms of a collaborative effort to procure an enhanced product that might be more useful to everyone. The GIS Steering Committee has taken the lead in organizing intergovernmental discussions to explore these possibilities for 2003 and beyond.

Source: Completed statewide coverage is based on 1993 NAPP imagery. Second generation currently being developed is based on 1999 NAPP source imagery. For information on local government high-resolution DOQs, contact the specific local government.

Standards: Statewide dataset of terrain-corrected (ortho-rectified) aerial photography at a 1:12,000 scale based on 1999 imagery and projected in both State Plane and UTM Coordinate Systems. http://mapping.usgs.gov/standards/

Estimate total investments in this Theme: Not available at this time

Contribution by Sector

Estimate of Current State Contributions: $650,000 approximately

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: None

What is needed? Completion is contingent upon continued funding and support for this project at approximately the current levels and timelines at both NDNR and USGS.

What is the likely source? The Nebraska DNR has entered into a work share agreement with the USGS to produce revised DOQs based upon 1999 aerial photography and the 10-meter DEMs. At the time of this report, this project is on track for completion of statewide DOQ coverage by June 30, 2004.

Estimate total investments needed to complete this theme: The work share agreement called for this work to be completed by June 30, 2003. The work share agreement is based on a 50/50 split of state/federal resources and the state resources will be provided through existing NDNR resources. NDNR estimates that this project will require approximately $50,000 - FY 2003, and $40,000 – FY 2004.

Estimate the current allocation of funding include current state and local contributions (Budgeted, Needed, Gap): Not available at this time.

Describe possible ways to overcome this gap: No gap has been defined at this time.

Most appropriate data steward: Nebraska Department of Natural Resources and US Geological Survey for statewide DOQs and local government agencies in some cases.

Maintenance: Because of its wide range of applications, periodic updating of this dataset will likely be desired by a cross-section of state, local, and federal agencies. This is

particularly true for areas in the eastern part of the state with higher population and higher levels of development activity. To some degree, the on-going local DOQ development efforts in the Omaha and Lincoln areas will address this need. The acquisition of digital imagery by FSA-USDA will also help meet some of this need for updated imagery. At this time, there are no specific plans for future DOQ development or acquisition beyond the completion of the current 1990 imagery effort. In the past, this in-house DOQ development effort has depended upon the NAPP aerial photography program for imagery and therefore any changes in that program will impact any future in-house DOQ update efforts.

Estimate maintenance cost: Not available at this time.

Theme: Elevation

Why it is a priority. Surface elevation models are another geospatial dataset that has been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. Most surface elevation models, commonly known as Digital Elevation Models (DEMs), are based on a regularly spaced grid of points for which the elevation of the earth's surface is known at each point.

The availability of DEMs for a given area enables a wide variety of GIS applications to be undertaken for which the relative altitude or slope of the earth's surface are important characteristics. The availability of DEMs also provide the data infrastructure to enable a GIS to generate a 3-D model of the earth's surface and drape aerial photography and/or conceptual project plans over that 3-D model for a "real world" perspective.

Current Status. As a result of the same three-year work share agreement between the Nebraska Department of Natural Resources (NDNR) and the USGS that produced the Digital Orthophoto Quads (DOQs), a statewide dataset of 1:24,000-scale DEMs was completed for Nebraska in 1998. These DEMs are based on a grid of regularly spaced points, 30-meters apart, and were foundation databases used to develop the initial Nebraska DOQs.

In a follow-up pilot project to develop new DOQs based on newer 1999 photography, it was determined that the quality of DOQs were sufficiently improved with the use of 10-meter DEMs, over the 30-meter DEMs, and that the resources required to develop 10-meter DEMs were justified. Based upon the results of this pilot project, it was recommended that future statewide DOQ production (1:12,000) should be based on 10-meter DEMs.

The NDNR/USGS work share agreement to develop new DOQs based on 1999 photography, also included a joint effort to create statewide 10-meter DEMs. At the time of this report, NDNR has completed the initial 10-meter DEMs development work for all of Nebraska's counties, with about 8 partial counties still in the USGS certification review process.

The City of Lincoln and Lancaster County, as a part of its 1997 orthophotography project, also generated a digital terrain model (DTM) from which 2-foot contours were derived. Theses DTMs cover 296 sections in and around the City of Lincoln.

Source: Complete statewide coverage based on 10-feet interval contours (hypsography digital line graph) derived from the existing USGS 7.5-minute topographic maps.

Standards: The 7.5-minute DEM data are digital representations of cartographic elevation data from USGS 7.5-minute topographic maps stored in a raster form. The DEMs consist of an array of elevations for ground positions at regularly spaced intervals. The DEM data are stored as profiles with a 10- or 30-meter square grid spacing along and between each profile. http://mapping.usgs.gov/standards/

Estimate total investments in this Theme: Not available

Contribution by Sector

Estimate of Current State Contributions: $650,000 approximately

Estimate of Current Federal Contributions: Not available

Estimate of Current Private/Local/Other Contributions: None

What is needed? Initial development work on the new 10-meter DEMS has been completed for all of Nebraska's counties. Approximately 8 counties are still in the process of USGS review and certification. It is expected that this certification process will be completed for all of Nebraska's counties not later than December 2002.

What is the likely source? USGS will provide the in-house resources to complete certification review.

Estimate total investments needed to complete this theme: At the time of this report, this statewide DEM project is near completion. All of the initial DEM development work has been completed and the quadrangles for just a few of Nebraska's counties are still in the review process. It is not anticipated that additional resources will be needed to complete this theme.

Estimate the current allocation of funding include current state and local contributions (Budgeted, Needed, Gap): Not available at this time.

Describe possible ways to overcome this gap: No known gap at this time.

Most appropriate data steward: Nebraska Department of Natural Resources and US Geological Survey

Maintenance: It is unlikely that there will be significant maintenance needs on this dataset until new technologies, such a LIDAR become more affordable and accessible for use in wider areas.

Estimate maintenance cost: Not available at this time.

Theme: Cadastral

Why it is a priority. The Nebraska GIS Steering Committee and the Federal Geographic Data Committee have both identified the cadastral/PLSS database as a high priority for

development. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. A geospatial cadastral database provides both standard identifiers and locational (latitude/longitude) coordinates for the PLSS corners.

The Public Land Survey System (PLSS) section corners in Nebraska are the basis for defining all land ownership in our state. Establishing reasonably accurate locational coordinates for these corners provides a necessary foundation for modernizing local government land records. There are approximately 100,000 such PLSS section corners in Nebraska, and they were originally surveyed roughly 125 years ago. In theory these PLSS section corners define one-mile squares, but the practical reality is that there are wide variations in the actual distance between the original placements of these corners.

However, it is the original placement of these corners that legally defines all land ownership parcels. Determining the "real world" coordinates of these original corner placements is one of the biggest hurdles that is slowing the adoption of modern geospatial technologies to manage and access land ownership records. A wide range of state, local and federal government agencies and private sector entities utilize land ownership data. Since the PLSS is the legal foundation for defining all land ownership parcels in Nebraska, and geospatial land ownership data is needed by a wide variety of entities, the development of a geospatial PLSS database must be a key component of the state's data infrastructure development plans.

Current Status. Currently there are two relatively low-resolution, statewide Nebraska PLSS databases available for public use. The Nebraska Department of Natural Resources (NDNR) developed a statewide PLSS database in the early 1990s and another was developed by the Bureau of Land Management (BLM) in 1997 to provide a basis for Nebraska PLSS pilot projects. Using different methodologies, both databases were derived from digitizing section corners, as shown on the USGS 1:24,000 topographic quad maps, and therefore have a spatial accuracy, which cannot be verified without extensive investigation. The two databases have been cross-checked and adjusted for obvious errors. While these two databases were derived from the same source data, they each incorporate some distinct built-in features (identification schemes, attributes, etc.), which facilitate their use in specific applications. The 2000 and 2001 Nebraska GIS Strategic Plans called for the State Surveyors Office and the NDNR to work together to integrate the best features of these databases to create one standard cadastral database, with standard identifiers for all PLSS corners.

In some of Nebraska's more populous areas, local governments have independently developed enhanced cadastral databases. These locally derived cadastral databases reflect a significant investment by local governments to enhance the PLSS database, unfortunately they cover only a relatively small geographic area of Nebraska's large land area.

A 1997-98 joint pilot project effort by the GIS Steering Committee and the State Surveyors Office tested both a methodology and an organizational model for the cooperative development of an enhanced cadastral database. As a result of this cooperative initiative, PLSS pilot projects were implemented in three of Nebraska's counties (Adams, Merrick, and Dawson). These projects focused on testing the applicability of a software methodology developed by the US Bureau of Land Management (BLM). The pilot projects were also designed to test the organizational feasibility of relying primarily on local government partners to actually do the bulk of the data development. The results of these pilot projects

showed that the software approach was valid for the development of an enhanced, upgradeable cadastral. However, the organizational approach of relying primarily on local government personnel for data development did not appear to be workable in most situations. Since these initial cadastral pilot projects, this methodology has been used only to a limited extent, primarily due to the lack of resources to apply the methodology on a broader scale.

Current resources available in the State Surveyors Office allow that office to respond, in a limited manner, to unique opportunities to assist specific counties or agencies if they wish use this methodology to develop a cadastral database for their counties. Significantly more resources will be needed to develop a statewide, common reference cadastral database and thereby provide the data infrastructure needed for the statewide modernization of land records in compatible formats.

While the PLSS pilot projects demonstrate the widespread support for cooperative cadastral efforts, they also suggested that totally voluntary, decentralized efforts are not a practical, cost-effective approach for the development of this database. In response to the need to develop practical mechanisms for intergovernmental partnerships in this area, the Nebraska GIS Steering Committee has worked with the key organizational players to outline a Nebraska Land Record Modernization Study. It is the intent of this study to engage the cross-section of interested institutional entities in a process to define a collaborative approach for developing and maintaining statewide digital cadastral data. This study is being undertaken as part of cooperative agreement with USGS in support of Nebraska I-Team planning. At the time of this report, an RFP has been published and a consulting firm (GeoAnalytics) hired to assist the GIS Steering Committee in conducting this study. GeoAnalytics started their work on this study in September 2002 and anticipate completing the study by June 2003. Additional discussion of this initiative is available as part of the Land Record Modernization goal discussion later in this report.

The need to develop practical mechanisms for intergovernmental partnerships and collaboration for the cadastral has also been recognized at the national level, as illustrated by a Western Governor's Association (WGA) cadastral resolution passed in June 2000. Partly in response to the WGA resolution, over the last couple years there has been an increased level of discussion and proposal development between the US Bureau of Land Management (BLM) and states to explore avenues for further state, local and federal collaboration in cadastral development and maintenance. Most of these national cadastral discussions have revolved around two initiatives, one focused on the states involved in the WGA, and the other focused on the rest of the nation and referred to as the Eastern States Cadastral Initiative. In these discussions, Nebraska, and the others states in a north/south tier of states running from North Dakota to Texas, finds themselves in the unfortunate situation of not being well integrated into either of these initiatives. Most of the states in the WGA share the characteristic of federal government agencies owning or managing 50% or more of the land in those states. Because of this reality, these federal agencies have been actively involved in land record modernization in those states. While the north/south tier of states that includes Nebraska is formally part of the WGA, they are “unique” in that so little of land is owned or managed by the federal government. Consequently, this tier of states has not been well integrated in previous federal cadastral efforts, nor do they easily fit within current initiatives. On the other hand, an Eastern States Cadastral Initiative has focused on outlining proposals for those states where, in the past, the federal government has not been particularly active with cadastral efforts. Unfortunately, geographic area of this initiative has been defined as including those states not part of the WGA (including Iowa and Missouri, but not Nebraska).

Consequently this tier of states, including Nebraska, find themselves somewhat the "odd man out" in these current national cadastral policy discussions and proposal development efforts.

Source: Using different methodologies, the NDNR and the BLM databases were both derived from digitizing section corners, as shown on the USGS 1:24,000 topographic quad maps. The two databases were crosschecked and adjusted for obvious errors.

Standards: http://www.blm.gov/nils/

Estimate total investments in this Theme: Not available

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? While new technical issues and concerns will undoubtedly surface, many of the technical issues (methodology, standards, etc.) have been addressed as part of the earlier Nebraska PLSS pilot project efforts. To develop an enhanced statewide cadastral database a cooperative partnership between state, local and federal partners will probably be required, particularly for the rural areas of Nebraska. To move forward with the objective of creating a standardized, statewide cadastral database, there are at least four areas of needed focus, in the near term.

Development of Intergovernmental Model. The biggest challenge is to engage the various stakeholders in a collaborative process to develop a rough consensus around an intergovernmental model that can facilitate the cooperative development and on-going maintenance of this core infrastructure database. Such a process will need to make recommendations that will involve legislation and funding issues. For such a process to ultimately be successful, it will be important to have support for the process from policy makers in both the Executive and Legislative branches and key associations representing the various stakeholders. The Nebraska Land Record Modernization Study is designed to address this challenge. It is important that all of the key stakeholders actively participate in this study to insure its success.

Merging Existing Low-Resolution PLSS Databases. There currently exists two relatively low-resolution, statewide PLSS databases available for public use. Both were derived from digitizing section corners as shown on the USGS 1:24,000 topographic quad maps and therefore have a spatial accuracy which cannot be verified without extensive investigation. A considerable amount of error checking has already been done between the two databases. Efforts by NDNR and the State Surveyors Office to integrate the best features of these two databases would create one standard, low-resolution PLSS database, with standard identifiers for all PLSS corners. This low-resolution PLSS database could then serve as an interim common reference cadastral database and also serve as the framework for on-going cooperative efforts to develop an enhanced cadastral database.

Engagement in National Cadastral Dialogue. Given the "poor fit" of Nebraska and the other states in its north/south tier, in either of the two state/federal cadastral initiatives currently

being formulated, it will be important that representatives of the Nebraska GIS Steering Committee and the Governor's Office actively engage in these dialogues.

Cadastral Enhancement As Opportunities Allow. Until a more comprehensive approach has been developed for cadastral enhancement, the Nebraska GIS Steering Committee and the State Surveyors Office will actively encourage public and private entities to work with the State Surveyors Office to do any cadastral development in a format consistent with the database model developed in the PLSS pilot projects. To the extent that the State Surveyors Office has resources available, they will provide assistance to state, local and federal government entities in this pursuit.

What is the likely source? The agencies and organizations represented on the Nebraska GIS Steering Committee include most of the key stakeholders in the Land Record Modernization Study. The ultimate success of this study depends largely on their engagement and input in the study process. The State Surveyors Office and the Nebraska Department of Natural Resources are the key players in making the integration of the two separate, but similar, low-resolution Nebraska PLSS databases happen.

Estimate total investments needed to complete this theme: This information is not available at this time, but it is hoped that the Nebraska Land Record Modernization Study will provide some of this information.

Estimate the current allocation of funding include current state and local contributions (Budgeted, Needed, Gap): Not available at this time

Describe possible ways to overcome this gap: The Nebraska Land Record Modernization Study that is currently underway offers the best hope for developing a consensus public policy approach for a state, local and possibly federal partnership to develop and maintain cadastral data on a statewide basis.

Most appropriate data steward: Local governments and the Nebraska State Surveyors Office

Maintenance: Database will likely require on-going maintenance to incorporate new and more accurate information on the position of PLSS corners as it becomes available.

Estimate maintenance cost: Not available at this time.

Theme: Ground Transportation

Why it is a Priority. A comprehensive statewide transportation network database is another geospatial dataset that has been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. It is a priority for development because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

A comprehensive statewide transportation network database would include an accurate geospatial representation of the location/route of the state's highways, roads and streets along with standard identifiers for each road feature and at least a minimum subset of attribute data

related to those roads. For a state like Nebraska that covers a large geographic area, highways and other roads are critical components of the public infrastructure. As we move increasingly into the digital world, so too has digital geospatial information about those road networks become critical components of the data infrastructure that is important for a wide range of applications. Among the applications for which geospatial road network databases are important are the following:

- Homeland Security, Public Safety and Emergency Response.
- Transportation Planning
- Highway and Road Maintenance
- Economic Development
- Transportation Routing

Current Status. Nebraska has approximately 95,900 miles of state and local roads. Within the past decade, Nebraska Department of Roads (NDOR) has created, and continues to maintain geospatial graphics and associated attribute records for 9,967 miles of state-maintained highways and approximately 20,000 miles of local arterial routes and collector routes, at a scale of 1:24,000 Therefore approximately 30,000 miles of state and local roads are currently in the NDOR GIS transportation database, out of an overall statewide total of 95,900 miles.

In 1999-2000, NDOR worked with an interagency Transportation Database Advisory Committee of the Nebraska GIS Steering Committee to devise a strategy for how the remaining approximately 66,000 miles of local roads might be integrated into the NDOR statewide road network database to form an initial comprehensive ground transportation database. The strategy developed called for NDOR to convert existing graphic/non-GIS local roads files into GIS format so that they might be incorporated into the statewide geospatial transportation database. June 2002 was established as a target for completion of this initial phase. At the time of this report, the local roads vectors for all of Nebraska's counties have been completed except for two counties. It is expected that Sarpy and Saunders Counties will be completed by December 2002. This process has developed the vectors only for the 66,000 miles of local roads. At this time most of these local road vectors do not have any intelligence (attributes) associated with them. This will be a later phase of the overall transportation database development effort.

The Advisory Committee also recommended that to provide a means for maintaining and upgrading the local transportation features in its database, that NDOR should take the lead in working with local governments to develop a system of common identifiers for all geospatial road network features (road segments, intersections, etc.) consistent with NSDI Framework Transportation Identification Standards. The initial NDOR timeline calls for the adoption and incorporation of these standard transportation feature identifiers by June 2003.

Source: Files were originally created for each county using Intergraph's World Mapping software. An additional file was created for each county for digitizing the city plats. The USGS DLG's were then brought into the files. From that point several data sources have been used to enhance and tighten this transportation layer, such as our General County Maps and City Plat series, the State Tourist Map, Highway Inventory Notes, GPS, etc.

Standards: Existing NDOR Transportation Network Database meets 1:24,000 National Map Accuracy Standards and incorporates NDOR feature identifiers and attributes. Current

plans call for state/local/federal collaboration to develop and incorporate a common identifier scheme consistent with the NSDI Framework Transportation Identification Standards, http://www.fgdc.gov/standards/status/sub5_7.html.

Estimate total investments in this Theme: $150,000

Contribution by Sector

Estimate of Current State Contributions: $150,000

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? Effort and resources are need on two tracks to complete the integration of all local roads into a comprehensive statewide GIS ground transportation layer and to develop a system whereby it can be updated and maintained. One track involves cooperative endeavors with local governments to test, and modify as necessary, the current NDOR feature identification schema so that it will meet, or at least be compatible with, most of the needs and applications of the local transportation data layer users. Once a mutually acceptable common transportation feature identification scheme is developed, the second track would require technicians to add this intelligence to the local road networks vectors.

Two related pilot efforts are currently being considered as part of the NDOR GIS strategic planning effort. One effort would incorporate existing NDOR feature identification schema into the transportation data layer of a county just in the beginning stages of local GIS development. This would be followed by a deliberate effort to explore the suitability of the NDOR feature identification schema for the range of anticipated local transportation-related applications. The goal would be the development of a modified (if necessary) NDOR feature identifier system that could also work for local government applications and which could ultimately provide the means for on-going updates of the statewide transportation database from local governments transportation databases. A parallel and complementary effort would seek to incorporate into the existing NDOR transportation database the transportation data layer from a local government, which already has an advanced GIS implementation. As part of this effort, the NDOR feature identifiers would be added to this existing local transportation dataset. This would serve the dual purposes of incorporate NDOR identifiers into this existing dataset to provide a means for automated on-going updates and provide another venue for evaluating NDOR identifiers for their compatibility and suitability for local transportation applications.

What is the likely source? Nebraska Department of Roads personnel with cooperation from local governments will likely be the primary means of supporting this effort. If the development of a related statewide, street centerline/address database is prioritized for Homeland Security and a wide range of other applications, then some additional resources may be available from other agencies to help expedite the development of this database (see discussion of Street Address database on page 30).

Estimate total investments needed to complete this theme: $500,000

Estimate the current allocation of funding include current state and local contributions: Budgeted - $0, Needed - $500,000, Gap - $500,000

Describe possible ways to overcome this gap: The effort to develop a mutually acceptable transportation features identification scheme will require the active participation of at least 2-3 local governments, a liaison/coordinator role, a technician, and possibly a broader advisory panel. Once a common identification schema is adopted, a technician(s) would be required to incorporate those identifiers into the road network database.

NDOR could accomplish all this using their personnel, however, it may take a quite awhile to get it done. If this effort were prioritized, additional resources for coordination could potentially be available from the GIS Steering Committee and technical production could be contracted to private vendors. This effort should be closely coordinated with current discussions related to the interagency need for a comprehensive statewide street centerline/address database for Homeland Security and a wide variety of other applications.

Most appropriate data steward: Nebraska Department of Roads and local governments

Maintenance: Nebraska Department of Roads, local governments and the Census

Estimate maintenance cost: Not available at this time.

Theme: Administrative Boundaries

Why it is a Priority. A set of geospatial databases that provide both the location and shape of the key governmental unit boundaries (municipal, congressional or legislative district, counties, etc.) is another dataset that has been prioritized for development by both the Nebraska GIS Steering Committee and the Federal Geographic Data Committee. This dataset is also a core geospatial dataset for the USGS National Map effort and the current draft guidelines for critical Homeland Security geospatial data needs. It is a priority for development because it is one of a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users.

A wide variety of data collection activities and public policy decisions involve referring to a given activity or resource relative to its location within a particular governmental unit. The availability of geospatial databases that outlines these governmental unit boundaries allows the use of geospatial technology to analyze data relative to its particular governmental unit and facilitates achieving public policy objectives relative to those governmental units.

Current Status. A Governmental Units Database Advisory Committee, of the Nebraska GIS Steering Committee, identified a core set of governmental unit boundary databases that are widely needed, assessed their current availability, and developed some recommendations for their development, maintenance and distribution. That Advisory Committee found that the following core geospatial governmental unit databases have been developed by a variety of agencies and are currently available to the general public and public agencies:

Legislative Districts	Congressional Districts	State Board of Education
Board of Regents	Supreme Court Districts	Game and Parks Districts
NRD Districts	Counties	Township/Range
Fire Districts	School Districts	

The Advisory Committee also found that while information on the governmental boundaries listed below was available in a paper format, it was not apparent where current information on these boundaries can be reliably accessed in a digital, geospatial data format.

Municipal Boundaries Tribal Lands

Since the Advisory Committee issued its report, the Nebraska Department of Roads has indicated that they will develop and maintain a reasonably current (updated annually) coverage of the Nebraska municipal boundaries. At the time of this report, the NDOR municipal boundary coverage was approximately 85% complete. A reasonably current municipal boundary coverage is also available through the 2000 Census data. Since the Advisory Committee issued its original report, the Nebraska GIS Steering Committee has been informed that digital geospatial Tribal Land boundaries, within the State of Nebraska, are available through the Bureau of Indian Affairs.

The Advisory Committee noted that most of these boundary databases were maintained by and available from a variety of agencies. However, for the average GIS user it was not always readily apparent how one would go about finding and getting a copy of these databases. The Advisory Committee also noted that while these governmental boundary databases are available, many of them are not currently documented with the standardized metadata, which facilitates both their cataloging in geospatial data clearinghouses and allows users to evaluate and properly utilize the databases.

As part of its agency-specific GIS strategic planning initiative, the Dept. of Roads decided to include municipal boundaries in its overall geospatial database. The effort by the Dept. of Roads to incorporate and annually update, this municipal boundary data in their geospatial database will provide a source for this key geospatial database that was not previously available.

As a result of discussions within the Nebraska I-Team, three additional administrative boundary databases have been identified as needed by several participating agencies:

Federally-owned land State-owned lands Local health organization boundaries

Source: This information is derived from a variety of sources and maintained by several agencies. For example, most of the electoral districts are based on state legislation and in the past the geospatial databases have been developed and maintained by the GIS staff based in the Clerk of the Legislature. The school district boundary database is maintained by the Nebraska Department of Education based on information from local school districts. The municipal boundaries database has been developed by the Bureau of the Census and will be updated by the Nebraska Department of Roads based on information provided by municipalities in their annual reports related to cost sharing for road/street maintenance.

Standards: The standards for these databases vary related to the specific agency maintaining the databases. Most of the boundary databases are at a 1:24,000 scale of spatial accuracy.

Estimate total investments in this Theme: Not available at this time

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? There are two primary areas of need related to this data theme in Nebraska. There is a need for an interagency effort to get these varied databases documented with FGDC-compliant metadata and then to list them on a FGDC-compliant clearinghouse with links to online access points. In addition to these overall concerns, there is also a need to address how the electoral district databases will be maintained and distributed now that the Clerk of the Legislature no longer has a GIS position on staff.

What is the likely source? The Nebraska GIS Steering Committee can offer encouragement and support for agency efforts to develop metadata to document these datasets, but the metadata ultimately must be developed and maintained by the agency maintaining the specific databases. The GIS Steering Committee has a key role to play in developing an enhanced comprehensive Nebraska geospatial data clearinghouse so that these databases can be easily located and accessed. *(see the Data Sharing and Distribution goal for further information)*.

Estimate total investments needed to complete this theme: Not available at this time

Estimate the current allocation of funding include current state and local contributions: Not available at this time

Describe possible ways to overcome this gap: Gap not defined at this time.

Most appropriate data steward:

Clerk of the Legislature *(need to be revisited given recent staff changes)*
- Legislative Districts
- Congressional Districts
- State Board of Education
- Board of Regents
- Supreme Court Districts

Nebraska Department of Natural Resources
- NRD Districts
- Counties
- Fire Districts

Nebraska Game and Parks Commission
- Game and Parks Districts

Nebraska Department of Education
- School Districts

Nebraska Department of Roads
- Municipal Boundaries

Nebraska State Surveyor
- Township/Range

Bureau of Indian Affairs
- Tribal Lands

Data stewardship responsibility for these datasets have yet to be defined
- Federally-owned land
- State-owned lands
- Local health organization boundaries

Maintenance: Maintenance needs and plans vary considerable by database and agency

Estimate maintenance cost: Not available at this time.

Theme: Geodetic Control

Why it is a Priority. The Federal Geographic Data Committee has identified Geodetic Control as a high priority for development. This database is among a select subset of framework databases that provide basic data infrastructure for a wide cross-section of GIS applications and geospatial data users. This database provides the foundation for tying all other geospatial databases to a common spatial reference framework and therefore enables other databases to be combined and analyzed based on this common spatial reference.

Current Status. A 1998 report, developed by the State Surveyor, on the Geodetic Control data available for Nebraska noted the following. "The current data set is somewhat fragmented. National Geodetic Survey (NGS) provides information on all control, which has been submitted, for inclusion in their data. This information is disseminated in many forms including optical discs and the Internet. Individual agencies such as Nebr. Dept. of Roads, Nebr. Dept. of Natural Resources, and County Surveyors maintain records of monuments not submitted for inclusion in the NGS set. In some cases this information is difficult to locate and not available in digital form."

"The creation of a database for geodetic control monuments, beyond that maintained by NGS may not be a good idea at this time. The use of GPS for survey quality geodetic control is increasing as accuracy improves and cost declines. Users of GPS do not have the same requirements as those who employ conventional surveying methods. Conventional surveying methods require control monuments to be reasonably close to the work area (usually 5 kilometers or less). Survey quality GPS methods extend this range considerably to a point where the monuments contained within the NGS data are usually adequate. Local counties who have enacted zoning ordinances requiring geo-referencing for new subdivisions have a need for control beyond that provided by NGS. Many Land Surveyors do not have GPS capability and make the connections by conventional survey methods. In the case of Lancaster County, the County Surveyor has improved the density of the control and makes it available to the public."

In 1996, NGS and several Nebraska partners cooperated in the development of High Accuracy Reference Network (HARN) for Nebraska. This HARN network consists of 214 monumented control stations scattered across Nebraska for which the locational coordinates have been determined, to a very high degree of accuracy, with the use of Global Positioning Satellite (GPS) technology. This HARN data is available through the NGS database.

The current assessment is that for a wide range of GIS applications the current statewide geodetic Nebraska control network and its associated NGS database probably provide adequate horizontal control. However, for some local GIS implementation projects, there may be merit in establishing additional local geodetic control. It was the assessment of this working group that efforts to enhance vertical control (elevation) should be of a higher priority than efforts to enhance horizontal control.

Source: The available geodetic control data for Nebraska comes from multiple sources. While available from multiple sources, the geodetic control data that has been incorporated into and is available through the National Spatial Reference System (NSRS), maintained by NGS, must meet clearly defined standards outlined in the NGS Blue Book for the various orders of horizontal and vertical accuracy. Specific state and local agencies are the only source for information on the geodetic control data maintained by those agencies outside of the NSRS.

Standards: http://www.ngs.noaa.gov/FGCS/BlueBook/

Estimate total investments in this Theme: Not available at this time

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? The current assessment is that with the increasing availability of GPS technology, the currently available geodetic control network is adequate for a wide range of applications. The exception would be local applications such as engineering developments or local government development of geospatial land records. In these situations, a project-specific densification of the local geodetic control network is probably warranted. As additional resources become available, efforts to enhance the vertical control network would be have considerable benefit.

What is the likely source? Not available at this time.

Estimate total investments needed to complete this theme: Not available at this time

Estimate the current allocation of funding include current state and local contributions: Not available at this time

Describe possible ways to overcome this gap: Gap is not currently defined

Most appropriate data steward: National Geodetic Survey

Maintenance: National Geodetic Survey and local governments

Estimate maintenance cost: Not available at this time.

NON-FRAMEWORK LAYERS

In addition to the Framework data layers outlined above, the Nebraska GIS Steering Committee has also identified three additional datasets that it feels should be priorities for statewide development due to their unique importance to Nebraska. These three additional priority data layers are: ground water features – wells, soil surveys, and street addresses.

Theme: Ground Water Features - Wells

Why it is a priority. In late 1998 the Nebraska GIS Steering Committee authorized the formation of an interagency Water Resources Database Advisory Committee to study the need for water-related geospatial databases and make recommendations. The Advisory Committee identified 26 water-related databases needed by the interagency Committee members. Of those 26, the Advisory Committee ranked the surface water features as its highest priority and the groundwater/water wells database as its number two priority for development.

Because of the importance of water to Nebraska, numerous state, local and federal agencies collect, analyze and use data related to water wells and the associated groundwater. As a result of a variety of programs in different agencies, a large volume of data related to wells and groundwater has been collected, and continues to be collected. Unfortunately, the lack of a universally applied water well identification scheme makes it very difficult and costly to integrate this data across the different programs and agencies. For many programs, enhancing the ability to share, integrate and analyze groundwater data across programs and agencies would provide a more cost-effective way to achieve program goals and to monitor program results.

Personnel from a given agency frequently need to make repeat visits, over a period of time, to a particular well to collect water samples. In some areas, there are numerous wells located in close proximity to each other without obvious physical features to make them uniquely stand out. Absent a unique identifier placed on a particular well, it is sometimes difficult to insure that agency personnel are indeed getting repeat samples from the same well. This difficulty is compounded if the sample visits are separated by several months of time and/or made by different personnel from the same or a different agency. This difficulty is further compounded when one attempts to integrate data collected from supposedly the same well by multiple agencies, without the benefit of a unique well identifier placed on that particular water well to provide a common unique reference.

In a similar manner, accurate information on the location of water wells is increasingly important to many programs. The water well locational data most readily available to most users is from the Registered Wells Database, which contains information on over 100,000 registered wells and is maintained by Dept. of Natural Resources (NDNR). In most cases, the locational data in this database was derived from mathematical estimates based on the center of PLSS sections or distances from the PLSS corners, as recorded on the well registration form. For many of today's applications, this locational information is not sufficiently accurate, particularly when there are multiple wells in relatively close proximity.

Current Status. Over a period of years, different agencies have developed and maintained separate identification schemes that are used to index the water well and groundwater data they collect and maintain. The closest approximation we have to a universal well identifier system is the Registered Well ID maintained by NDNR. Unfortunately, even though they are legally required to be registered, many wells are not. Even when they are registered, it is sometimes difficult to determine the registered well ID when one is in the field taking samples, as there is no identifier placed on the well itself. Because of this problem, a few Natural Resource Districts (NRDs) have begun to place their agency-specific identifier tags on wells as they visit them in the field.

Because of the growing importance of having relatively accurate information on well locations, many agencies are now investing public resources to use Global Positioning Satellite (GPS) technology to collect more accurate locational coordinates on water wells. Unfortunately, there has been no systematic, interagency program in place to make this more accurate locational information collected on specific water wells generally available to the broader user community.

An interagency Working Group was established by the Water Resources Database Advisory Committee to research and develop an action plan to address the need for a standard reference water well database, with enhanced locational coordinates for wells. That Working Group initially focused on the challenge of making enhanced data on the location of water wells

available to the larger user community. A 1999 survey of state, local and federal agencies, discovered that GPS readings had already been collected on over 17,500 wells by NRDs, NHHS, NDEQ, and USGS, with future plans of collecting GPS readings on over 6,500 wells/year. The problem was lack of any systematic method for making the results of these individual agency efforts available to the larger community. The Working Group developed consensus methodologies for documenting how enhanced locational data on wells was derived and general conceptual agreement for procedures to integrate this data into the Registered Wells Database maintained by NDNR. The Nebraska GIS Steering Committee passed a resolution supporting the Working Group's recommendations and urging agencies' support for their implementation.

The Working Group is also looked at the difficulty of integrating existing water well-related databases across agencies and programs. The Group determined that a key to overcoming this is the implementation of a standard water well identifier that could be used to cross-reference the various databases. The Group has also suggested that for such a common identifier system to be successful implemented, it is important that this common, unique well identifier be physically attached (tagged) to the well to provide a means for the various agencies to collect and then enter this well identifier into their databases as they visit the well sites. The Group's recommendations suggest that the most effective and practical first step is to require that such an identifier be placed on all new wells as they are registered. The Group's recommendations also suggest coupling this tagging of new wells with an effort by state and local agencies to tag existing wells, as those agencies visit the well sites in the course of their regular work. A parallel, and complementary approach, is an effort by the Nebraska Water Center to develop a cross-reference database of the various ID schemas.

Since the issuance of this Working Group report, initial follow-up efforts have focused on initiatives to get more wells legally registered and therefore incorporated into the Registered Wells database. The Nebraska Legislature, in 2001, passed new statutory language requiring that the licensed well drillers, instead of the well owners, register new wells. To further facilitate well registration, NDNR has also developed an online well registration process. In addition, there has been an increased focus on interagency efforts (NDNR, NHHS, and NRDs) to identify existing, non-registered wells and encourage the owners (public and private) to register these wells, as required by statutes. State statues have also recently been changed so that there is no longer a fee associated with changing/updating information on a well registration. It is expected that this will result in a considerable increase in well owners and NRDs filing updated information on well location and other characteristics.

Source: The water well information currently contained in the Registered Wells Database maintained by the Nebraska Department of Natural Resources (NDNR) is derived primarily from well registration forms submitted by well owners. It is assumed by those knowledgeable in this field that there are very large numbers of wells that are not registered. For the vast majority of the registered wells, the locational coordinates have been derived from section or quarter-section centroids, or estimated from approximate distance measurements listed on the well registration form. Some of the more recent data comes from a change in state statutes that make well drillers responsible for registering the wells.

Standards: The quality and accuracy of the estimated locational coordinates varies tremendously. Draft metadata standards to assist in documenting the source and quality of the locational coordinates have yet to be implemented.

Estimate total investments in this Theme: Not available at this time

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? Efforts to incorporate the enhanced GPS well locational data, which has been collected by other agencies, into the NDNR Registered Wells Database have been delayed due to the lack of available resources at NDNR. As additional resources become available, it is hoped that this GPS locational data collected by one agency can be shared with others by incorporating it in the Registered Wells database.

What is the likely source? Unknown at this time.

Estimate total investments needed to complete this theme: Not available at this time.

Estimate the current allocation of funding include current state and local contributions: Not available at this time

Describe possible ways to overcome this gap: Reallocation of scarce technical resources within NDNR, increased appropriation from Legislature, grants or assistance from other agencies

Most appropriate data steward: Nebraska Department of Natural Resources

Maintenance: Nebraska Department of Natural Resources

Estimate maintenance cost: Not available at this time.

Theme: Soil Surveys

Why it is a Priority. Because of the overall importance of agriculture to Nebraska's long-term social and economic well-being, the development of digital soils data is another statewide geospatial databases that has been prioritized for development by the GIS Steering Committee. The development of high resolution, digital county soil survey data, in a geospatial format, will provide key data that is needed for farm and ranch management applications to take advantage of GIS technology. Geospatial soil data also provides key information that can be used, in combination with other data, for siting facilities such as landfills, housing developments, and sanitary lagoons. This digital geospatial soils data is also an important factor in determining the value of property for assessment purposes. The federal government has prioritized the development of digital SSURGO soils data and has made available to US Natural Resources Conservation Service (NRCS) specially earmarked funding to support these efforts during a five-year window of FY 1997-2002.

The NRCS originally developed the paper County Soil Survey Manuals. These county soil manuals contain maps that outline the approximate shape and location of areas with similar soil characteristics, and provide detailed associated information on the characteristics of each particular soil type. The NRCS has developed national standards (known as SSURGO) for

the conversion of these paper maps to digital geospatial format. As part of the process of conversion to digital SSURGO format, the spatial accuracy of the county soil maps will be enhanced by recompiling the maps on a DOQ base map. When one considers that Nebraska includes approximately 49,500,000 acres or 77,355 square miles of area, the overwhelming magnitude of the task of converting these paper soil maps to digital geospatial format becomes apparent.

Current Status. Four years ago, three agencies (USDA-NRCS, Conservation and Survey Division-UNL, and the Nebraska Department of Natural Resources) initiated a large-scale, joint effort to develop statewide digital county soil surveys at a 1:24,000 map scale. Prior to initiated in this large-scale development effort, the only available statewide digital vector soils database was at a more generalized map scale of 1:100,000. As of August 2002, of Nebraska's 93 counties, only 6 counties have yet to have SURRGO soils development commence, another 11 counties are in various stages of completion, and all the remaining counties have been completed and certified by NRCS.

The goal of this joint development effort is to develop statewide SSURGO digital county soil maps by June 2003. The project is currently on schedule. Assuming that continued funding is available for the three primary agencies, it is expected that statewide SSURGO soils coverage will be completed by June 2003.

Source: The data is being derived from existing county soil surveys recompiled on 1993 DOQ/DEM basemaps.

Standards: http://www.ftw.nrcs.usda.gov/ssur_data.html

Estimate total investments in this Theme: Not available at this time

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? Continued funding for the three primary agencies.

What is the likely source? Congress and State Legislature

Estimate total investments needed to complete this theme: Not available at this time

Estimate the current allocation of funding include current state and local contributions: Not available at this time

Describe possible ways to overcome this gap: Gap is not defined at this time.

Most appropriate data steward: Natural Resources Conservation Service - USDA

Maintenance: Natural Resources Conservation Service - USDA

Estimate maintenance cost: Not available at this time.

Street Addresses Database

Why it is a Priority. As the human services and Homeland Security-related applications (education, welfare, public safety, emergency response, etc.) of GIS technology have grown, a parallel need for a geospatial street address databases has also grown. A preliminary needs assessment of Homeland Security and emergency planning and response needs related to GIS, identified a statewide street address database as one of the priority needs. A geospatial street address database includes a map of street centerlines and attribute data that provides the street address ranges for each side of a street or road segment (i.e. for each city block). Such a geospatial street address database provides the foundation data for a process known as geo-coding, the efficient, large-scale determination of the locational coordinates for common street addresses. This then allows common street addresses to be plotted on a map and integrated with a wide variety of other spatial data. While human services-related applications are one of most common areas of need for geospatial street address databases, they are also used for other applications such as determining the spatial coordinates for regulated facilities, emergency response or transportation routing.

Current Status. There is a growing use and interest in street address geospatial databases by state agencies such as the Nebraska Health and Human Services System (NHHS) and state and local government agencies for emergency response. Street address geospatial databases are currently available from both the public and private sector. There is considerable variability in the overall quality, currentness, and costs of these databases. One of the most common and readily available street address geospatial database is the TIGER files developed and maintained by the US Census Bureau. The overall quality of the TIGER database is fair, however, it has enough problems that a market has developed to support the efforts of private firms to enhance the TIGER database and sell the resulting product. The quality and currency of the TIGER data varies by geographic area and the TIGER data for the more rural areas frequently is of significantly poorer overall quality. The use of private street address databases can be costly and usually involves a license agreement, which prohibits the sharing of the database with other users. Some local governments are developing local street address databases for use within their E911 operations or broader local GIS applications. These needs are likely to grow because of new regulations related to emergency response and cellular phone usage. State and local government agencies have in the past used both public and privately available street address geospatial databases.

An interagency exploration is needed to determine the aggregate demand for this type of data and to research the possibilities for partnership in developing or licensing a street address geospatial database for shared public agency use. On the federal level, there are discussions between the Census Bureau, the Bureau of Transportation Statistics–USDOT, and the USGS related to the development of a shared transportation/address database standard. Even with nationally defined standards, these federal agencies would likely look to partner with state and local governments to develop and maintain this dynamic data.

At the state level, one of the major questions that must be addressed, relative to this database, is which state agency will be the lead agency in terms of development and maintenance of a statewide street centerline/address database. Unlike most other geospatial databases, where there is a broad need and interest, in Nebraska there is no obvious state agency, which should be the primary data steward. The Nebraska Department of Roads (NDOR) has stepped forward to develop a statewide street centerline database. However, while NDOR would

have some applications for a street centerline/address database, its applications are perhaps less than some other state agencies such as the Nebraska Emergency Management Agency or the Nebraska Health and Human Services System. This is one of those databases that would clearly fit into the area of responsibility of a statewide GIS service bureau, but Nebraska lacks such an entity to serve the state GIS enterprise. Therefore, one of the early hurdles to overcome in an effort to develop this critically needed database will be the identification of a state agency willing and able to service as the lead agency for stewardship of this dataset.

The 2000 Nebraska GIS Strategic Plan noted the need to convene an intergovernmental Street Address Database Advisory Committee to make recommendations on the possibilities for a shared street address geospatial database. At the time of this report, such an Advisory Committee has not yet been established.

Source: Road and street centerline data will be from the Nebraska Department of Roads and local governments. Street address ranges must be collected from local governments on an on-going basis.

Standards: Not available at this time

Estimate total investments in this Theme: $2,000,000

Contribution by Sector

Estimate of Current State Contributions: Not available at this time

Estimate of Current Federal Contributions: Not available at this time

Estimate of Current Private/Local/Other Contributions: Not available at this time

What is needed? An intergovernmental Advisory Committee on Street Centerline/Address Databases should be convened by the Nebraska GIS Steering Committee and charged with making recommendations on standards, funding and draft implementation plans.

What is the likely source? The Nebraska GIS Steering Committee must provide the coordination to pull this interagency effort together.

Estimate total investments needed to complete this theme: Not available at this time

Estimate the current allocation of funding include current state and local contributions: Not available at this time

Describe possible ways to overcome this gap: Gap is not defined at this time.

Most appropriate data steward: Local governments and yet to be determined state agency

Maintenance: On-going maintenance, with updated information provided by local governments, must be a significant component of any implementation plan.

Estimate maintenance cost: Not available at this time.

NON - DATA DEVELOPMENT GOALS AND INITIATIVES

In addition to the long-range goal related to the development of priority databases, the GIS Steering Committee has identified six other long-range goals or initiatives that it sees as directly related to *"Building a Spatial Data Infrastructure for Nebraska"*. This section provides an update on activities and plans related to these non-data development initiatives.

GIS AND HOMELAND SECURITY*. Continue to assist, as requested, the Nebraska Emergency Management Agency and other emergency and public safety agencies in planning for short and long-term GIS and geospatial data requirements to support Homeland Security and other public safety initiatives.*

Why it is a Priority. Timely, accurate information, easily accessed and capable of being shared across federal, state, and local political jurisdictions is fundamental to strengthening the decision-making capability of those tasked with the homeland security mission. It is estimated that geographic location is a key component of approximately 80-90% of all government data. Geospatial information technology utilizes the locational component of data to provide the capability to quickly visualize activity patterns, map locations, and understand the multi-layered geospatial context of emergency situations.

The potential applications of the GIS technology to emergency preparedness and response have been clear for some time. In the aftermath of the September 11th attacks, it has become even clearer that in emergency situations of whatever origin, our nation and/or state is dependent on rapid access to and application of many types of current, accurate geospatial information. Among the critically needed information is the following:

- Facilities and operations susceptible to attack.
- Critical infrastructure, including telecommunications; electrical power systems; gas and oil production, storage and distribution; banking and finance; water supply systems; emergency services.
- Accurate employment data tied to specific locations.
- Detailed and current "framework" data, including orthophotography, transportation, elevation, political boundaries, property ownership, hydrography and geodetic control.

GIS technology is capable of quickly rendering one or several layers of digital geospatial data into map-like products. These systems can facilitate near-real time performance of a wide range of relevant geospatial analyses. These characteristics make geographic information technologies, combined with appropriate sets of geospatial information, an invaluable tool for the handling, display, and analysis of information involved in every aspect of Homeland Security.

Current Status. At the time of the September 11th attacks, the Nebraska Emergency Management Agency (NEMA) had very limited GIS capabilities. In the aftermath of September 11th, NEMA indicated its interest in rapidly developing GIS capability. The initial NEMA focus was on conducting an analysis of critical infrastructure in the state. In response to this interest, the Steering Committee Coordinator and representatives from several of the Steering Committee agencies met with NEMA personnel and provided technical assistance, including background information on a range of issues that should be considered when establishing a GIS and on currently available geospatial databases. As a follow-up to this initial meeting, a detailed listing of available geospatial data and related contacts were provided and several agencies worked with NEMA to provide geospatial data to facilitate its initial critical infrastructure analysis.

To meet its initial short timeline for an initial critical infrastructure analysis, NEMA engaged the services of temporary outside GIS personnel engaged on a consultant basis. From a longer-term perspective, both the GIS Steering Committee and NEMA have noted the importance of developing sustainable institutional arrangements, which will facilitate rapid access to current versions of geospatial databases that are maintained by a variety of agencies. In this regard, NEMA requested assistance from the Nebraska GIS Steering Committee to assist NEMA to identify geospatial data needs and make other recommendations to enhanced NEMA's capability to apply GIS technology to Homeland Security needs.

Where We Are Going. In response to the request for assistance from NEMA, a preliminary assessment was conducted by contacting the key state agencies involved in Homeland Security and emergency planning and response. The preliminary assessment approach was taken because of the need for at least some interim recommendations on a fairly short timeline. As a result of this preliminary assessment, an interim report was prepared outlining initial findings and recommendations*, "The Use of Geographic Information Systems (GIS) To Support Homeland Security —Recommendations For The Nebraska Emergency Management Agency".* The full report is available in the appendix of this document. The interim report noted the need for a more in-depth analysis and planning as time and resources permit. Among the recommendations outlined in this interim report are the following:

- Identify and prioritize geospatial data needs;
- Additional GIS technical personnel resources (in-house or contract) are needed by NEMA
- Need for GIS data integration services and technical assistance;
- Create a Homeland Security emergency response data team;
- Collect accurate locational coordinates on key facilities;
- Develop an enterprise-wide geospatial data clearinghouse/center for Nebraska;
- Develop or acquire a statewide street address database;
- Integrate data needs into emergency response planning drills;
- Insure ready availability and capability to conduct plume dispersion analyses;
- Define data stewardship agreements with other agencies for key databases;
- Define specific interagency data coordination protocols for updating and sharing key databases; and
- Arrange for security and remote access to key databases.

LAND RECORDS MODERNIZATION INITIATIVE. *Promote and facilitate local government land record modernization and GIS development.*

Why it is a Priority. One of the most promising and cost-effective application areas of GIS technology is the modernization of how local government land records are maintained and accessed. The property parcel/land record information maintained by local governments is also one of the geospatial databases that are needed by a wide variety of state, local and federal agencies and private entities. It is in the interest of the broader GIS user community that this land record information be developed in a standardized geospatial format that is accessible to multiple users at the local, state and federal level. Because of the limited resources available at

the local government level, partnerships will be necessary in many areas to facilitate the development and maintenance of this data.

The 2000 Nebraska GIS Strategic Plan identified several initiatives that would help to facilitate the process of modernizing these local government land record systems and the development of the digital geospatial property parcel databases that are needed for a variety of state, local and federal applications. These initiatives included:

- The development of two statewide framework geospatial databases: the Public Land Survey System (PLSS) and digital ortho-imagery.
- The development of a set of guidelines and background education material to assist local government in the modernization of their land records and the development of a multipurpose local GIS.
- The development and distribution of model inter-local agreements for the cooperative development, maintenance and funding of geographic information systems core data.
- The exploration of the support for and feasibility of developing regional professional service centers to assist local governments and other public entities to aggregate and provide for their surveying, mapping, GIS, and the possibility other professional service needs.
- The implementation of an educational outreach program designed to maximize the overall return on local government investments in the development of geographically referenced databases and GIS systems by providing educational materials, presentations and coordination services to the public officials who will be making these investment decisions.

Current Status. The status of the efforts to develop statewide digital geo-referenced aerial photography and a Public Land Survey System database are outlined elsewhere in this report, under the Priority Database Development and Maintenance Initiative. Together, these two databases would provide the foundation base maps necessary for the development of geospatial property parcel databases.

An intergovernmental Advisory Committee on Standards for Multipurpose Land Information Systems has developed a 90+ page Nebraska Guidebook for Local Government Multipurpose Land Information Systems. While this document does not yet include all the sections originally envisioned, the core sections are complete and they have been widely circulated among local government officials and the private vendor community.

In Nebraska, land records are maintained at the local government level and the dynamic public information related to changing land ownership flows through local government offices. Therefore, as a necessity, local governments must be integrally involved in any land record modernization effort. However, many local governments do not have the resources to undertake land record modernization by themselves. Many regional, state and federal agencies also have an interest in the development and maintenance of modern geospatial land records in a consistent and statewide-compatible format. In Nebraska, one of the biggest hurdles to land record modernization is the lack of a consensus around a policy and structural framework that will facilitate local, regional, state, and federal agencies collaboration, on an on-going basis, to support land record modernization.

In pursuit of such a policy/structural consensus, the GIS Steering Committee has worked with many of the key institutional players to outline a Nebraska Land Record Modernization Study. The goal of this study will be both to outline the issues and possible alternatives for a

collaborative land record modernization initiative and to bring together the key players and constituencies in a process to explore the possibilities for a consensus approach. As part of a cooperative agreement with the USGS for I-Team planning in Nebraska, $50,000 in funding has been made available by USGS to conduct this study. Following an RFP process, GeoAnalytics, a Wisconsin-based consulting firm, has been retained to assist the Steering Committee in conducting this study.

The Steering Committee continues to support education and outreach efforts directed toward local government officials through projects such as biennial GIS Symposiums, presentations at Nebraska Association of County Officials and League of Nebraska Municipalities meetings, and the development and distribution of the Guidebook for Local Government Multipurpose Land Information Systems. However, a more focused and comprehensive effort in this regard is beyond the current resources available to the Steering Committee.

Where We Are Going. Completion of the Nebraska Land Record Modernization Study is scheduled for no later than July 1, 2003. It is hoped that this study will provide the key institutional players with the background information and policy consensus needed to move forward to jointly promote the public policy initiatives needed to realize this goal. As designed, this study is intended to provide information and recommendations in the following areas:

- Assessment of the current status of land record maintenance at the local government level in Nebraska;
- A review of state/local partnership models in other states;
- Document and analyze options for creating and maintaining a statewide digital, geospatial property parcel (cadastre) layer and associated land ownership records;
- Outline the business case for land record modernization; and
- Make recommendations related to the institutional arrangements and implement steps necessary to create and maintain this data on a statewide basis.

DATA SHARING AND DISTRIBUTION. *Develop structures, standards, and processes that facilitate easy access to, integration, and usability of publicly available geospatial data.*

Why it is a Priority. A key component of any coordinated GIS development strategy must be the development and maintenance of mechanisms to facilitate the sharing of widely needed geospatial data. In the aftermath of the September 11th terrorist attack, the importance of reliable, efficient mechanisms for geospatial data sharing have become very evident. In times of an emergency, responders need quick access to the most accurate and current data available, and in data formats that can be quickly and easily integrated.

There are several essential elements to such a data sharing strategy. These include the easy ability to discover the existence of data and how it may be accessed. Most GIS experts would suggest that 80 to 90% of GIS implementation costs are commonly related to geospatial data development or acquisition. One of the surest ways to reduce the level of investment required for geospatial data development is to locate existing geospatial datasets, developed by someone else, that will meet some or all of your data needs. Geospatial data clearinghouses are a key component of the evolving spatial data infrastructure. Data clearinghouses are intended to provide a systematic approach for cataloging and locating available geospatial data for a particular area or region.

The documentation of the data to facilitate its proper use is another essential element of facilitating data sharing. If someone gets a geospatial dataset from someone else it is difficult to determine the appropriate use of that data if it is not documented with metadata (data about the data). Likewise, when there is a substantial public investment in the development of a database, the parallel development of metadata is important to preserve the public investment in that data. Without adequate metadata documentation, when the key staff members, who originally developed a given database, leave the organization it is sometimes difficult to justify continuing to use that database. Without adequate documentation to explain how database figures or coding were derived it is difficult to defend policy or regulatory decisions based on that data. Standardized metadata also provides the basis for potential users to find available geospatial data through geospatial database search tools that have been developed around metadata standards.

Current Status. The Nebraska GIS Steering Committee has long recognized that facilitating data sharing and distribution as one of its priority goals. Nebraska currently has two geospatial data clearinghouses, neither of which is comprehensive in nature. One is maintained by NDNR and is used to catalog geospatial data maintained by the NDNR Databank. The other, the Nebraska Geospatial Clearinghouse is hosted by Nebraska Online on behalf of the Nebraska GIS Steering Committee. While this clearinghouse does provide a listing of several key statewide geospatial databases, there are numerous other databases that are currently available that are not currently listed in the clearinghouse, either because they have not been documented or cataloged. The Steering Committee has noted in previous GIS Annual Reports and Strategic Plans that it does not have the resources that are needed to maintain a comprehensive geospatial clearinghouse for Nebraska.

In November 2001, the Steering Committee authorized the formation of an Advisory Committee on Facilitating Geospatial Data Sharing. This new Advisory Committee was charged with making *"recommendations related to the structures, standards, and processes that should be developed to facilitate easy access to, integration, and usability of publicly available Nebraska-related geospatial data,… with a particular focus on the related policy and funding issues."* The Steering Committee adopted the Advisory Committee recommendations at its September 2002 meeting. The complete report is in the appendix of this document.

Where We Are Going. The Advisory Committee's report outlined both short-term objectives that could potentially be realized with little or not additional resources and a longer-term vision of an enhanced enterprise geospatial data center for Nebraska that should be pursued as resources permit. Among the recommendations are the following:

<u>Short-term, limited resources efforts</u>

- Merge two existing clearinghouses into one enterprise clearinghouse hosted by the Nebraska Dept. of Natural Resources.
- Nebraska GIS Steering Committee to be ultimate owner of Clearinghouse with NDNR the trustee charged with operational responsibility, subject to available resources.
- Survey agencies to identify existing Nebraska-related geospatial data
- Encourage development of metadata documentation of existing data and listing on enterprise clearinghouse

Longer-term institutional structures and policies

- As resources become available, work with NDNR to develop an enhanced enterprise geospatial data clearinghouse/center to serve the Nebraska geospatial data user community and provide a broader range of data access and support services outlined below:
  - Online Catalog and Data Access Point
  - Help Desk
  - Data Integration Services
  - Interactive Internet Mapping Support Center
  - Technical Assistance
  - Pooling Resources for Cooperative Projects

TECHNICAL ASSISTANCE. *Provide technical assistance to local governments and state agencies.*

Why it is a Priority. With the growing interest in GIS, the technology is no longer just being used by a limited number of fairly large public agencies. It is becoming a powerful mainstream information technology, with a wide variety of state and local level agencies either developing or having an interest in developing GIS applications. With this growing interest in the technology, there is a parallel growing need for technical assistance to help these agencies develop their GIS/geospatial data or applications. These technical assistance needs range from guidance in designing and planning the development of an in-house capability; to specialized GIS application development; to large-scale geospatial data development projects; to on-going development and maintenance of specific GIS applications.

Up to this point, the primary operational model in Nebraska has been for each agency or local government to develop and maintain its own in-house GIS capability. This has worked fairly well in that most of the early adopter agencies already had technical personnel on board and had a fairly wide range of GIS/geospatial applications they wanted to develop. With more and more agencies expressing interest in the technology, it is time to consider the merits and efficiencies that might be gained by arrangements to aggregate the demand and resources available to support these technical services. The need for this pooling of demand and resources is particularly apparent in the rural and non-urban areas of Nebraska, where individual local governments or agencies frequently lack the resources to support the technical services they need to adequately fulfill their responsibilities. At the state government level, it is a question of the optimum use of public resources. Should each new agency interested in utilizing GIS technology develop its own in-house capabilities or should other models be explored for how best to meet this growing interest in the technology.

Over the last several years, the need for GIS technical assistance has been raised in several forums. In the 2000 Strategic Plan, the GIS Steering Committee outlined two conceptual models, which it felt should be explored as possible approaches for addressing the growing need for GIS technical assistance**.**

- **Regional Professional Service Centers.** Explore the support for and feasibility of developing regional professional service centers to assist local governments and other public entities to aggregate and provide for their surveying, mapping, GIS, and other possible professional service needs.

- **GIS Service Bureau.** Work with the Executive and Legislative Branches of state government to explore the need and support for designating and providing base funding for a GIS service bureau for state government. The service bureau's mission would be to provide (upon their request) state/local agencies with assistance in the development and analysis of geospatial data, the development of GIS applications, and to provide operational support for implementing the GIS Steering Committee's coordinated development priorities.

In 2001, a GIS Steering Committee Advisory Committee on Interactive Internet Mapping made a number of recommendations related to the most cost-effective means of implementing this relatively new technology. Among the Advisory Committee's recommendations was that consideration should be given to the establishment of a spatial data access and support center.

> *"A State of Nebraska spatial data access and support center (GIS portal) should be established to facilitate efficient access to and sharing of Nebraska-related geospatial data* ***and to provide appropriate technical support*** *to assist the multiple users of this data in state, local, and federal agencies, the private sector and the general public."*

Current Status. The dramatic events of September 11th served to further highlight the need for increased GIS-related technical assistance and data sharing among government agencies. The desire to quickly develop and maintain a GIS capability for emergency planning and response has illustrated both the short-term needs and the long-term necessity for both enhanced technical assistance and data sharing capabilities.

As noted elsewhere in this report, in 2002 the Nebraska Emergency Management Agency (NEMA) requested the GIS Steering Committee assistance to enhance its capabilities to apply the power of GIS to emergency planning and response. In response to this request, a subcommittee of the GIS Steering Committee conducted a preliminary needs assessment and made a number of findings and recommendations in it report, *"The Use of GIS To Support Homeland Security"*. Among those findings and recommendations was the need for GIS technical assistance for NEMA and other new GIS implementers *(see appendix for full report)*.

Also in 2002, the Steering Committee tasked a new intergovernmental Advisory Committee on Facilitating Geospatial Data Sharing to look at the whole area of facilitating data sharing. Among the recommendations of this Advisory Committee was that an enterprise-wide geospatial data center be developed that would provide a range of services to the GIS user community, including technical assistance *(see appendix for full report)*.

Where We Are Going. Most of the key issues and concerns involved in enhancing the technical assistance available to local governments and state agencies are related more to intergovernmental public policy and structural issues than they are to technical issues. Studies and recommendations such as the Advisory Committee on Facilitating Geospatial Data Sharing, the GIS and Homeland Security recommendations, and the Land Record Modernization Study help to clarify the needs and issues involved. However to be effective, these studies and recommendations must then be followed up with interagency public policy efforts to build the institutional structures required to address these technical assistance needs.

EDUCATION/OUTREACH. *Promote an educational outreach program designed to maximize the overall return on public investments in the development of geographically referenced databases and GIS systems by providing educational materials, presentations and coordination services to the public officials and technical staff who will be making these investment decisions.*

Why it is a Priority. While GIS can no longer be considered a new technology, it is still new and relatively complex for many of the agencies and policy makers who are now considering

their initial public investments in the technology. Without education and/or technical assistance these public sector decision-makers can easily make costly mistakes in their initial GIS investment decisions. The risks of costly mistakes have less to do with the hardware and software, and more with data purchase or development decisions. This need is particularly acute in relation to local governments. Local governments make substantial investments in mapping and aerial photography in the course of fulfilling their areas of responsibility. For many county commissioners, county assessors, and agency directors these are new areas of expertise. Public investments in a GIS educational/outreach program, directed toward government decision-makers, would increase the probability of wise public investment decisions in GIS technology and data. Such an education program would increase the likelihood that costly geospatial databases developed for one area and application, would not only work as intended for that application, but also for other areas and applications. Such an education/outreach program is a vital component of a coordinated GIS development effort.

Current Status. The GIS Steering Committee has attempted to address these GIS-related outreach, education and coordination needs. However, its efforts have, of necessity, been limited because of the lack of program resources. The GIS Steering Committee works cooperative with the non-profit Nebraska GIS/LIS Association to facilitate communication/coordination within the growing GIS community. Over the last several years, the Steering Committee has regularly staffed an educational booth at the Nebraska Association of County Officials (NACO) Annual Conference and has provided other presentations as the opportunity and resources allow. The Multipurpose Land Information System Guidebook project, outlined under the Land Records Modernization initiative, is focused on developing guidelines to assist local government officials to make wise public investments in GIS technology.

The GIS Steering Committee is currently working with the Nebraska GIS/LIS Association to organize and host a 2003 Nebraska GIS Symposium in Lincoln. In the past, over 300 participants have participated in this biennial event

Where We Are Going. The GIS Steering Committee will continue to work with groups like the Nebraska GIS/LIS Association, NACO and the League of Nebraska Municipalities to encourage and provide GIS-related education and outreach programs. Unless additional resources are made available, all of these efforts will be severely handicapped by the lack of program resources.

STRENGTHEN COORDINATION CAPACITY. *Strengthen the GIS Steering Committee's operational capability to facilitate the implementation of priority geospatial database development decisions, data sharing, interagency/intergovernmental partnerships, and agencies' utilization of GIS technology.*

Why it is a Priority. While Nebraska statutes define broad areas of responsibilities for the Nebraska GIS Steering Committee, the Committee has very little in the way of independent authority and/or resources to seriously address those responsibilities. With limited authority and no operational capability or budget, Steering Committee decisions and priorities can only be implemented through the sponsorship and active support of independent state, local or federal agencies.

The coordination of GIS development for the overall good of the broad and growing Nebraska GIS user community is a unique and challenging mission not specifically shared by any other public entity. In some specific instances other agencies' missions and priorities are congruent

with those of the Steering Committee and in those cases those agencies may take the lead on a project on behalf of the Steering Committee. However, where this parallel sense of priorities does not exist, the Steering Committee is seriously limited in its ability to implement its priorities.

GIS and geospatial data are key information technology tools that are becoming integrated into the way many public agencies fulfill their missions. Core framework geospatial datasets are vital components of our shared information technology infrastructure. Higher long-term public costs will be the result, if we do not put in place effective mechanisms to develop and maintain common, shared versions of these key pieces of our shared data infrastructure.

Many of today's major geospatial data development efforts are only feasible through intergovernmental partnerships. The Steering Committee's current structure is poorly suited to facilitating the actual implementation of those partnership projects. The availability of seed funding specifically dedicated to collaborative GIS development efforts, combined with the financial management capability to efficiently combined and leveraged other intergovernmental resources could greatly enhance the Steering Committee's ability to implement collaborative GIS development projects..

In addition to highlighting the potential benefits of seed funding for collaborative geospatial data development, past GIS Strategic Plans have also outlined several other initiatives that would help to strengthen the overall coordination capacity of the Nebraska GIS Steering Committee:

- GIS Service Bureau,
- GIS Education/Outreach Program, and a
- Geospatial Data Clearinghouse

Current Status. The 2001 Nebraska GIS Strategic Plan noted that the GIS Steering Committee had been able to meet some of the need for collaborative seed funding by making limited use of the information technology grant funding available through the Nebraska Information Technology Commission. Unfortunately, due to current budget cutbacks, those NITC funds are no longer available to help encourage and facilitate collaborative projects.

During 2002, the GIS Steering Committee acted on its commitment to the Federal Geographic Data Committee (FGDC) and the US Office of Management and Budget (OMB) to take the lead in a formalized I-Team (federal, state, local and private) planning effort for Nebraska-related geospatial data and the broader National Spatial Data Infrastructure (NSDI) infrastructure. As part of this I-Team planning process, two meetings of the larger GIS community were held in 2002 and several Advisory Committee's have worked on issues raised in these I-Team meeting. This Annual Report is designed to also serve as a Nebraska I-Team Plan to help guide state, local and federal agency geospatial data efforts and facilitate collaborative projects related to Nebraska. Current plans call for convening semi-annual meetings of interested participants from federal, state, local and private entities to provide a forum to further explore and develop collaborative NSDI projects.

The recommendations from the Advisory Committee on Facilitating Geospatial Data Sharing *(see appendix)* also raised issues related to the need for strengthening vehicles for geospatial coordination and made several recommendations in that area. Among those recommendations was the development of an enhanced enterprise geospatial data clearinghouse/center for Nebraska. In addition to the enhanced data center itself, other recommendations that would

enhance overall coordination capabilities include mechanisms for pooling intergovernmental financial resources, Internet mapping services, data integration services and technical assistance.

Where We Are Going. The Implementation-Team (I-Team) state, federal, and local planning efforts re-enforce the collaborative planning model that has been the GIS Steering Committee's approach since its creation. The formalization of the I-Team concept and several other national GIS coordination initiatives serve to illustrate the growing demands for state-level GIS/geospatial data coordination.

The recommendations from the Advisory Committee on Facilitating Geospatial Data Sharing provide an outline for how the GIS community might work with policy makers to build some of the institutional structures needed to strengthen the ability of the GIS Steering Committee to respond to the growing needs for intergovernmental coordination. Resources are currently very tight at all levels of government. If these new collaborative mechanisms are to be put in place to serve the geospatial data user community, it will require the support of policy makers and a sustained commitment by a range of state, local, federal, and higher education institutions to pursue creative combinations of new and existing funding avenues and initiatives.

APPENDIX

ARTICLE 26
GEOGRAPHIC INFORMATION SYSTEM

Section.
81-2601. Legislature; Intergovernmental Data Communications Advisory Council; findings
81-2602. Geographic Information System Steering Committee; created; members; appointment; terms; expenses.
81-2603. Committee; officers; advisory committees; meetings.
81-2604. Committee; duties.
81-2605. Committee; report.

81-2601. Legislature; Intergovernmental Data Communications Advisory Council; findings. The Legislature finds that the Geographic Information System is a computer-based technology that captures, stores, analyzes, and displays information about the earth's surface from a geographically referenced system, that an interest in the system is rapidly increasing at all levels of government, and that an institutional mechanism is needed to encourage initiatives, coordinate efforts, avoid duplication, seek efficiencies, develop guidelines, policies, and standards for operations and management, promote education and training, and make recommendations so that such technology will benefit the entire state and endure as an analysis tool for decision makers.

The Intergovernmental Data Communications Advisory Council has found that there are many levels of experience, expertise, and hardware and software sophistication among the various levels of government and that guidelines, policies, coordination, and standards are required to realize the maximum benefits of this technology, avoid data quality problems., and resolve conflicts at a reasonable cost for the state.

It is the intent of the Legislature that a Geographic Information System Steering Committee be created with statewide responsibilities to take an active role in implementing the Geographic Information System. Such committee would help facilitate acquisition of such technology at all levels of government and make recommendations to the Legislature for program initiatives and funding and the fostering of communications, training, and education.

81-2602. Geographic Information System Steering Committee; created; members; appointment; terms; expenses. The Geographic Information System Steering Committee is hereby created and shall consist of eighteen members as follows:

(1) The director or designee of the Department of Administrative Services, the Department of Environmental Control, The Conservation and Survey Division of the University of Nebraska, the Nebraska Natural Resources Commission, and the Governor's Policy Research Office;

(2) The Director-State Engineer or designee;

(3) The State Surveyor or designee;

(4) The Clerk of the Legislature or designee;

(5) The secretary of the Game and Parks Commission or designee;

(6) The Property Tax Administrator or designee;

(7) One representative of federal agencies appointed by the Governor;

(8) One representative of the natural resources districts nominated by the Nebraska Association of Resources Districts and appointed by the Governor;

(9) One representative of the public power districts appointed by the Governor;

(10) Two representatives of the counties nominated by the Nebraska Association of County Officials and appointed by the Governor;

(11) One representative of the municipalities nominated by the League of Nebraska Municipalities and appointed by the Governor; and

(12) Two members at large appointed by the Governor.

The appointed members shall serve for terms of four years, except that of the initial members appointed by the Governor, one of the representatives of the counties shall be appointed for one year and the other shall be appointed for three years, one of the members at large shall be appointed for one year and the other for three years, and the representative of the public power districts shall be appointed for two years. Their successors shall be appointed for four-year terms. Any vacancy on the committee shall be filled in the same manner as the original appointment, and the person selected to fill such vacancy shall have the same qualifications as the member whose vacancy is being filled.

The members shall be reimbursed for their actual and necessary expenses as provided in sections 81-1174 to 81-1177.

81-2603. Committee; officers; advisory committees; meetings. The Geographic Information System Steering Committee shall elect a chairperson from its membership and such other officers as the committee deems necessary. As the need arises, advisory committees may be established by the committee from various levels of government, industry, or the general public to assist the committee.

The committee shall meet quarterly or upon the call of the chairperson.

81-2604. Committee; duties. The Geographic Information System Steering Committee shall:

(1) Make recommendations to the Legislature for program initiatives and funding;

(2) Establish guidelines and policies for statewide Geographic Information System operations and management to include:

(a) The acquisition, development, maintenance, quality assurance such as quality control standards, access, ownership, cost recovery, and priorities of data bases;

(b) The compatibility, acquisition, and communications of hardware and software;

(c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism;

(d) The fostering of training programs and promoting education and information about the Geographic Information System; and

(e) The promoting of the Geographic Information System development in the State of Nebraska and providing or coordinating additional support to address Geographic Information System issues as such issues arise;

(3) Report to, assist, and advise the Chief Information Officer in setting information technology policy; and

(4) Provide assistance as requested by the Nebraska Information Technology Commission to support the technical panel created in section 11 of this act.

81-2605. Committee; report. Annually, the chairperson of the Geographic Information System Steering Committee shall submit a written report, approved by the committee, to the Governor and the Clerk of the Legislature and shall send a copy of such report to the Intergovernmental Data Communications Advisory Council.

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as of November 2002

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The Use of Geographic Information Systems (GIS) To Support Homeland Security

Recommendations For The Nebraska Emergency Management Agency

SUMMARY

Emergency management combines planning, preparation and the optimum resources to mitigate and respond to an event. Good emergency management requires information that is accurate, current, timely, and quickly analyzed. Much of the information used for emergency management has a spatial dimension, which is reflected in questions such as: "Where are critical facilities located?" "What is the best route?" "What is the area of impact?" "How will the size of the impacted area change over time?" "How many people are in the affected area?" "What resources are located close by?" GIS technology provides the tools for displaying and analyzing spatial data in order to answer questions such as these.

A year ago, NEMA began developing a basic GIS capability. The initial goal was to gather comprehensive data on the state's critical infrastructure, which is used for planning purposes. NEMA's GIS project achieved its primary objective, but now faces several shortcomings. These include:

1. The databases use static information, which is difficult to keep current and becomes more outdated with time;
2. Access to the data and the GIS tools is restricted to the NEMA offices;
3. The GIS package includes extensive information on critical infrastructure, but lacks other databases and certain tools that would be useful for both planning and response management;
4. Staff resources in the future will not be sufficient to support the existing system or enhance it.

After a meeting to discuss areas of mutual interest, NEMA requested assistance from the Nebraska GIS Steering Committee to help define specific needs and develop recommendations for utilizing these tools in times of an emergency. The methodology used interviews with participants in a few key agencies, including NEMA, Department of Roads, Department of Environmental Quality, and Health and Human Services. These initial meetings produced a set of findings and recommendations that are reflected in this report.

The findings and recommendations reinforce the overall conclusion that NEMA and other state agencies should work to enhance GIS support for emergency management functions.

SCENARIOS

Timely, accurate information that is easily accessed and capable of being shared across federal, state, and local political jurisdictions is fundamental to the decision-making capability of those tasked with protecting life and property. The real-time ability to map locations, visualize activity patterns, and understand the multi-layered context of emergency situations is essential to emergency management activities.

To illustrate, consider the potential release of hazardous or toxic materials into the air near a populated area. GIS information and analytic tools could be used to calculate and map the likely dispersion plume. The projected dispersion plume could be overlaid and mapped on base maps showing streets and streams and could then extract the range of addresses likely to be impacted. Critical or sensitive facilities (nursing homes, schools, hospitals, etc.) within the dispersion area could be quickly identified and mapped. If relocation is warranted and prudent, the GIS could be used to identify and map the best available relocation centers in the immediate vicinity. The system could also be used to highlight those streets or access routes that might be contaminated by the hazardous release. In the case of fires, other hazardous material sites in the immediate vicinity could also be identified and mapped. With advance planning and data development, tailored maps could be quickly generated and sent to first responders and to policy makers for decision support. Specialized maps for public information could also be generated at a moment's notice and sent to media outlets and/or made available on the web.

The current state of geospatial information technology can provide decision-makers the data they need to confidently confront a wide variety of threats including natural disasters, terrorist attacks, sabotage and other similar crises. However, the current implementation of that technology in Nebraska, across all the federal, state, and local agencies and jurisdictions necessary to fully coordinate an effective response, is seriously lacking in some areas. Emergency management leaders and others should understand and implement the policy changes necessary to fully realize this technology's capability, and make the management decisions necessary to implement it on a statewide basis.

FINDINGS

Below is a summary of observations and findings that arose from the interviews:

1. Neither of the two lead agencies (NEMA and HHSS) in Homeland Security and Bio-terrorism has sufficient experience or capabilities with GIS technology to build an enhanced GIS application without assistance.
2. Homeland Security and emergency planning and response are inherently interagency and intergovernmental in nature. This is also true of the planning necessary for applying GIS technology to these situations. Much of the geospatial data needed in an emergency situation is dynamic in nature and is maintained by a variety of agencies. Rapid access and utilization of these varied datasets requires advance planning and the development of the infrastructure required to facilitate that data sharing.
3. Local emergency operations plans require street maps showing the location of hazardous materials and vulnerable facilities. The maps are all on paper and are based on "windshield surveys" from 1989.
4. NEMA needs accurate maps of all roads and the ability to share them with responders in conjunction with setting containment boundaries.
5. A fairly high level of GIS coordination, cooperation, and data sharing currently exists in Nebraska. However, the current coordination and data sharing processes are not structured nor sufficiently staffed to support reliable, rapid emergency response. Most current GIS applications are focused on agency-specific missions. While many of these agency GIS applications utilize data from multiple agencies, few, if any of these applications, require immediate data accessibility and integration from other agencies, in contrast to what would be needed in many emergency situations.

6. Much of the geospatial data needed for Homeland Security and emergency response applications already exists and is maintained by a variety of agencies. However, not all of the needed data exists, and some datasets, especially a statewide street centerline/address database, have such important emergency response uses that development should be a priority. In some cases the needed information exists but needs to be documented or converted to a format that would facilitate its rapid integration into an emergency response GIS application.
7. DOR's Intelligent Transportation System project plans to develop a web-based application for displaying highway closure and points of traffic restriction. This information would be very useful for emergency management, especially if it could be integrated with other GIS information.
8. Following the 1993 floods in Nebraska, an interagency GIS working group compiled a report on "Information Needed for Disaster Planning and Response, 3/11/94." That report should serve as the starting point for developing a GIS application for emergency management.
9. The strategy for providing GIS support for Homeland Security should rely on dynamic access to information and databases, which are maintained by other agencies as part of their on-going operational responsibilities.
10. Security and authorization for different levels of access must be an integral part of any strategy.

PRIORITY RECOMMENDATIONS

Identify and Prioritize Geospatial Data Needs. Initiate a systematic effort to work with key agencies to identify critically needed geospatial databases for homeland security and emergency planning and response by reviewing a variety of emergency response scenarios and identifying the likely data needs (i.e. development of county-specific emergency response or critical infrastructure manuals, radiological dispersion scenarios for a nuclear power plant incident, biological contamination of animal feedlot or other confinement facilities, etc.). Cross-reference the scenario specific data needs with other scenario data needs and the data needs of other emergency response agencies to identify priority/critical databases. Determine the current availability and quality of priority/critical databases to identify existing data deficiencies and define priorities for data development.

GIS Technical Personnel Resources. NEMA must have access to GIS technical staff, either based internally within NEMA or available to NEMA via contract with another agency or private entity, for on-going development and maintenance of GIS applications.

GIS Data Integration Services and Technical Assistance. In addition to the need to maintain a reasonable level of GIS personnel to develop and maintain on-going NEMA-related GIS applications and analysis, there is also a need for on-going data integration services that would facilitate the rapid integration of a variety of geospatial data sets. These types of on-going data integration services would be useful for the entire Nebraska GIS user community, but they would be particularly valuable in times of emergency so that NEMA personnel would not need to spend critical time performing these data integration functions. There is also an occasional need for specialized technical assistance to assist NEMA in developing special GIS and web-based GIS applications tailored to the specific homeland security and emergency response applications. The provision of these data integration services and specialized technical assistance could be a logical extension of an enhanced, enterprise-wide geospatial data clearinghouse.

Homeland Security Emergency Response Data Team. A Homeland Security Emergency Response Data Team should be created, with sufficient technical expertise, to assist NEMA with gathering and analyzing geospatial and other data in times of an emergency. In planning to meet these emergency data needs, this Data Team should assist NEMA to identify their likely data needs (including specific data elements or fields), identify the current availability status of needed data, assist with advance technical arrangement to insure the ready availability of that data from the multi-agency data stewards, and help make technical recommendations for the development of needed data that is not currently available.

Collect Accurate Locational Coordinates on Key Facilities. NEMA should participate in prioritizing key facilities and infrastructure and help initiate an interagency effort to collect accurate locational coordinates for those facilities using GPS (Global Positioning Satellite) technology or other methodologies.

OTHER RECOMMENDATIONS

Nebraska Geospatial Data Clearinghouse. The development of an enhanced, enterprise-wide Nebraska geospatial data clearinghouse which would provide reliable, ready access (via dynamic data links or direct data repository) to the most current and accurate versions of a wide variety of geospatial databases which might be needed for rapid emergency response, but which are maintained by a variety of state, local and federal agencies (i.e. road networks - NDOR, streams - NDNR, hazardous materials – NDEQ, critical facilities - HHSS, etc.)

Statewide Street Address Database. NEMA should help sponsor other geospatial databases that it needs to meet its requirements. The highest priority need is for a statewide street address database, which would serve a wide range of homeland security, bioterrorism, and emergency planning and response applications. A statewide road-street centerline/address database would allow for integrating and mapping a wide variety of existing databases that have street address fields in the database. Much of state and local government's existing data is referenced by street addresses. For maximum utility such a street address database should be available to share with all interested parties and not be constrained by private data licensing agreements.

Integrate Data Needs Into Emergency Response Planning Drills. Emergency response planning drills should include the data, analytical tools, and access for responding to emergency situations.

Plume Dispersion Analysis. Insure the ready availability and capability of NEMA (or its affiliated response agencies) to conduct a plume analysis to plot the probably geospatial dispersion of toxic or radioactive chemicals in the atmosphere. Insuring this capability would include ready access to the related data, the compatible hardware and software, and the technical expertise.

Data Stewardship Agreements. Work with the Nebraska GIS Steering Committee to define agreements among state, federal, or local agencies for the responsibilities of coordinating the on-going maintenance and upgrading of specific, critical geospatial databases (i.e. NDOR for highway and street centerlines, NDNR for streams, etc.) and their distribution to make it more likely that in an emergency the various actors will have both the same and best available data.

Define Specific Interagency Data Coordination Protocols. Defining specific database coordination initiatives between NEMA and other agencies that develop and/or maintain geospatial databases needed by NEMA which outline common data identifiers, feedback loops for data updating, and other common data standards to facilitate data sharing and rapid data

access and integration (i.e. DEQ-NEMA on hazardous material sites, NDOR-NEMA on roads and streets and possibly addresses, etc.)

Security and Remote Access. Authorized personnel should have secure access to information any time, anywhere, and any place.

Recommendations of an Advisory Committee on Facilitating Geospatial Data Sharing
— a subcommittee of the Nebraska GIS Steering Committee

FACILITATING GEOSPATIAL DATA SHARING IN NEBRASKA

Meeting the Growing Needs for
Enterprise-wide Access to Available Geospatial Data

INTRODUCTION

Timely, accurate information, easily accessed and capable of being shared across federal, state, and local political jurisdictions is now recognized as a fundamental component of sound public policy decision-making and good, efficient government. Over the last decade public entities have invested in the development of compatible database structures and networks to facilitate data sharing in pursuit of these information-sharing objectives.

During this same period, an increasing number of public and private entities have discovered that Geographic Information Systems (GIS) provide powerful tools for displaying, combining, and analyzing information based on its geographic location (latitude/longitude, etc.). GIS is now used by a wide variety of public entities for an even wider variety of applications. These applications range from reapportionment, emergency vehicle routing, highway pavement management, water quality management, property assessment, economic development, public health, and the more recent applications related to homeland security planning and response.

As more and more public and private entities adopt GIS technology, it has become increasingly important that institutions be developed to facilitate the reliable and efficient sharing of the geospatial information integral to these systems. The public costs of developing geospatial databases are one of the important reasons for developing mechanisms to facilitate data sharing. Today's governments can not afford to have multiple agencies investing scarce public resources in the development and maintenance of duplicate (or similar) databases. Sound public policy decisions are more likely when multiple agencies (state, local and federal) are making decisions based on the same data. Increased efficiency and enhanced public policy decisions-making will be likely results of coordinated public investments in the development and maintenance of quality, core geospatial databases coupled with mechanisms to share this data widely among public and private entities.

The terrorist attacks of September 11th have illustrated that it is also important that data sharing mechanisms be reliable in times of crisis, that they provide ready access to the most recent data maintained by multiple agencies, and that they provide access to data that has been pre-formatted to facilitate its rapid integration with other geospatial data. It was to address this range of needs and concerns that the intergovernmental Advisory Committee on Facilitating Geospatial Data Sharing was created and tasked with making recommendations for how we might meet the growing needs for enterprise-wide, ready access to available geospatial data.

BACKGROUND

While GIS can no longer be considered a new technology, its wide spread use among many agencies, many applications and numerous users is relatively new. In Nebraska, the Conservation and Survey Division at UNL was one of the early experimenters with GIS technology starting back in 1985. Other early users were the Nebraska Natural Resources Commission starting in '89, the Legislature in '91, the Dept. of Roads in '91, the Dept. of Environmental Quality in '92 and Game and Parks in '94. During this same period a similar

limited, specialized use of GIS was evolving in federal and local government agencies. In all of these instances, the early GIS users were based in just a few agencies, the specialized applications residing only on the computers operated by skilled technicians, and the applications relied on geospatial data that was primarily developed and maintained within that same agency.

However, over the last few years the nature of GIS users and applications has undergone major changes. These changes are related to the growing awareness of the potential of GIS technology, and the evolution of the technology in terms of its sophistication and ease of use. The current trend is toward widespread use of GIS technology across both the horizontal and vertical breath of public and private agencies. As a result of these changes, people with a wide range of technical skills are now using the technology. Many current GIS applications rely on the ability to readily access a variety of geospatial databases (roads, streams, aerial imagery, political boundaries and property parcels) that are both dynamic in nature and maintained by a variety of public and private entities. The relatively new phenomenon of providing a wide range of interactive GIS applications over the Internet (i.e. general public access of assessor's property parcel information via the Internet) is just one example that illustrates these trends.

These trends in GIS software, applications, and users have served to heighten the demand for mechanisms that facilitate easy, reliable, enterprise-wide access to geospatial databases that are developed and maintained by a variety of entities. Also contributing to this increasing demand for geospatial data sharing, has been a growing recognition that with limited public resources available it is vitally important that public entities avoid costly duplication by cooperating in the development and maintenance of the geospatial databases that are needed for many GIS applications

In pursuit of this intergovernmental cooperation, several state and federal geospatial coordination initiatives have been organized. Many of these coordination efforts have focused on a core subset of geospatial databases (roads, streams, aerial imagery, political boundaries, property parcels, etc.) that have become known as Framework Databases because they provide the underlying framework for so many GIS applications. Most of these coordination initiatives also highlight the need for mechanisms to provide easy access, across the enterprise, for these and other geospatial databases. Among these coordination initiatives are the following.

Nebraska GIS Steering Committee. Over the last several years this intergovernmental coordinating body has outlined in its annual reports the need and plans for the coordinated development of key geospatial databases on a statewide basis. These strategic reports have also consistently noted the needs for enhanced mechanisms for facilitating online geospatial data access and sharing across the enterprise.

Federal Geographic Data Committee. The FGDC is a federal level GIS coordinating body that works closely with its state counterparts. The FGDC took the lead in identifying Framework Databases, developing database standards, and actively works with states to encourage the development of a national network of geospatial data clearinghouses as a means to find and provide online access to existing geospatial data.

Implementation Teams. Implementation Teams (I-Teams) are a national initiative to bring together representatives of state, local, federal and private entities to define collaborative strategies for the development of widely needed geospatial databases and the means to distribute them. One of the priority needs identified in the draft Nebraska I-Team Strategic Plan is the development of a geospatial data center to serve the Nebraska GIS user community.

USGS National Map. For many years the US Geological Survey's 7.5" paper topography maps have served as the standard reference map for a wide variety of applications. Many state statutes, including Nebraska's, refer to these maps. Most of these maps are at least 30 years old and in need of revision and updating. As part of its National Map strategy, the USGS has made a strategic decision that it will rely on digital geospatial data, created largely at the state and local level, as the means to update and keep relatively current these standard reference maps. As currently envisioned, this evolving strategy will rely heavily on state-by-state data centers that provide the focal point for collecting, integrating, and providing online access to the digital geospatial data (see State of Delaware pilot, http://datamil.udel.edu).

Homeland Security. In the wake of the September 11th terrorist attacks the critical importance of ready, reliable access to a cross-section of geospatial data, from a wide variety of agencies, has become very clear. At the federal, state and local level, GIS and geospatial data collected from a variety of sources is being used for short-term homeland security planning efforts. In the longer-term, it will be important to be able to quickly access the most current geospatial data, from a variety of sources, to provide an informed basis for responding to emergencies.

CURRENT STATUS

There are currently two state-operated geospatial data clearinghouses, which allow GIS users to conduct online searches for available geospatial data related to the Nebraska geographic area. There are also several online clearinghouses operated by federal agencies, at the national or regional level, which contain Nebraska-related geospatial data among their data catalogues. Both of the state-operated clearinghouses are compatible with the FGDC national clearinghouse network. However, neither is comprehensive in the scope of their listings and as a consequence there are numerous existing Nebraska-related geospatial databases that are not currently listed and therefore not available through the clearinghouse network.

The Nebraska Department of Natural Resources operates one clearinghouse, which provides a comprehensive online, up-to-date listing of the data holdings in its Natural Resources Databank. Through this clearinghouse, online access is available to most, if not all, of the data holdings of the NDNR Databank.

The other state-operated clearinghouse, the Nebraska Geospatial Data Clearinghouse, was developed under the auspices of the Nebraska GIS Steering Committee, in cooperation with the Nebraska Library Commission. This clearinghouse node was originally developed as a pilot project, with the goal of ultimately building a comprehensive clearinghouse for Nebraska-related geospatial data. The clearinghouse was initially developed in 1995-96, with the support of an FGDC grant. As part of this pilot project, the necessary documentation was created for approximately 45 geospatial databases and an online clearinghouse node was established on a Nebraska Library Commission server. This clearinghouse node has since been moved to servers operated by Nebraska Online.

Unfortunately, since the completion of this clearinghouse pilot project, the GIS Steering Committee has not had the resources to continue the necessary outreach and education work with agencies to get their data documented and added to the clearinghouse catalogue. There are now numerous Nebraska-related geospatial databases that have been developed at the state and local level, but which are not currently documented and have not been added to the Nebraska Geospatial Data Clearinghouse catalogue. As a consequence, GIS users can not easily discover that these databases exist and they are not readily available for online access.

Related Initiatives. In exploring how we can best address the current gaps in providing online access to Nebraska-related geospatial data, it is important to consider several related initiatives that are currently underway or planned. In this time of scarce public resources, cooperation and coordination among these initiatives may hold the key to developing of a more comprehensive and enduring approach to facilitating Nebraska geospatial data sharing.

On the federal level, there are several related initiatives that are being proposed and/or developed. Among these is the evolving USGS vision of the National Map, and its proposed implementation through a series of state or regionally-based online digital mapping portals. While this initiative will probably not be as comprehensive in terms of the range of Nebraska-related data themes, it will however involve many of the same databases and similar infrastructure. America View is another USGS pilot program with possible synergy for the development of an enhanced Nebraska geospatial data center. The goal of America View is the development of state-level distribution mechanisms to provide rapid online access to recent satellite data. Another related initiative is the USGS pilot program to develop state-based USGS Mapping Project Offices, as one way to develop closer coordination with states and decentralize some of its national mapping operations. Finally, the President's Geospatial One Stop E-Government Initiative envisions creating a single Internet portal through which one could locate and access all federal agency geospatial data.

All of these federal initiatives share an understanding that if they are to be successful, they will require a fairly high degree of coordination with states. At the same time, it is also important to note that most of these initiatives do not currently have new funding available that could be used to help states provide the on-going support needed to maintain a geospatial data center.

On the state level there are also several initiatives that could possibly lend support to the development of an enhanced Nebraska geospatial data center. The Dept. of Natural Resources has agreed to host a combined clearinghouse (NDNR Databank and Nebraska Geospatial Data Clearinghouse) on their servers, given proper endorsement and support. The UNL Libraries have offered to conduct a survey of state agencies, universities, and natural resource districts to identify the geospatial data that are currently available but not listed in a clearinghouse and to help document that data.

The University of Nebraska Peter Kiewit Institute has recently announced that they will be acquiring a large scale server and creating an internet ESRI interactive map interface and web site to allow users to more easily locate and select location-based information along the Lewis and Clark Bicentennial (2003-2006) Celebration route. They have also expressed an interest in hosting and serving state geospatial data on this server. Several other state agencies are either considering or have developed plans to expand their current GIS capabilities (NDOR, NDEQ, NEMA, NPAT, NGPC, CSD-UNL). Many of these proposed plans involve developing additional interactive Internet mapping capabilities as a way to bring these analytical tools and information to either their field offices and/or the general public. For many of these applications, there are compelling reasons to base most of these initiatives within a specific agency. It is however a possibility that within these agency initiatives there are areas of potential collaboration that could lend support to the development of an enterprise Nebraska geospatial data center.

As avenues are explored for addressing the current need for a Nebraska geospatial data center, it is important to not forget the lessons learned from the Nebraska Geospatial Data Clearinghouse experience. If these intergovernmental data sharing programs are to be successful, they require resources for on-going development, maintenance and outreach. In considering the possible

synergy of the various federal and state programs, it is quite possible that through collaboration and partnerships we may be able to bring together the hardware and software infrastructure required for an online enterprise data center. More difficult, but equally or more important are the resources necessary to provide on-going support for the operation of an enterprise such as a Nebraska geospatial data center.

RECOMMENDATIONS

At the outset of the Advisory Committee's discussions, there was general agreement that the unmet needs in this area were substantial. However, it was also acknowledged that the resources available in the short-term to help address those needs were likely to be very limited, particularly in this time of state budget shortfalls. Based upon this understanding, the Advisory Committee decided to proceed to identify the unmet needs and to take a two-fold approach to making recommendations to address those needs. This two-fold approach involved:

a). Making recommendations for short-term limited resources efforts that could be undertaken, and have a reasonable chance of success, within the current constraints of little or no additional resources;

b). Outlining a consensus longer-term vision for the policies and structures that should be pursued, as additional resources become available, to address the longer-term needs for institutional structures and policies to facilitate an on-going, high-level of geospatial data sharing among the public and private sector in Nebraska; and

c). Following an 18-month period, the GIS Steering Committee and the Department of Natural Resources shall re-evaluate the policies, barriers, opportunities and options for facilitating Nebraska-related geospatial data sharing. The purpose of this re-evaluation is to determine how well the arrangements outlined in this document are working and to make recommendations for changes as necessary

Short-term, limited resources efforts

1) Initiate a process to create a unified, enterprise-wide, Nebraska geospatial data clearinghouse with the goal of ultimately providing a one-stop portal for searching for available geospatial data related to the geographic area of Nebraska. Recommended initial steps would involve merging the two existing online geospatial catalogues/clearinghouses which are currently operated by the State of Nebraska. The metadata catalog which describes a limited, cross-section of geospatial data themes and is currently hosted on the Nebraska Online servers would be combined with the metadata catalog describing the natural resources geospatial data currently hosted by the Nebraska Department of Natural Resources Databank. This enterprise geospatial data clearinghouse node would be hosted on a NDNR server and would be structured and maintained in a manner to be compatible with the national Federal Geographic Data Committee (FGDC) geospatial data clearinghouse network. This work would be conducted primarily by the staff of NDNR (as time and resources permit), with assistance from Nebraska Online staff and the Coordinator for the Nebraska GIS Steering Committee.

2) As an enterprise-wide Nebraska geospatial data clearinghouse, it is recommended that the Nebraska GIS Steering Committee would be the ultimate owner of this enterprise clearinghouse and NDNR would be the trustee charged with operational responsibility for the clearinghouse, subject to available resources. NDNR staff commitments would require the endorsement of the NDNR Director. Under this conceptual model, the Steering

Committee would have the primary responsibility to take the lead in pursuing any additional resources needed to insure adequate support for clearinghouse-related functions. It is recommended that the Nebraska Department of Natural Resources and the Nebraska GIS Steering Committee develop a Memorandum of Agreement to further define the nature and terms of this relationship.

3) Identify other existing geospatial data that is not currently listed in either of the existing metadata catalogs/clearinghouses via an online survey. Due to current resource limitations, the initial survey would focus on state agencies, institutions of higher education, and natural resources districts. The survey should identify not only what geospatial data exists, but also whether the data is documented. This online survey will be conducted primarily by the staff of University of Nebraska - Lincoln Libraries, with the assistance of the Coordinator for the Nebraska GIS Steering Committee.

4) Agencies with existing geospatial data, that is not been documented with metadata, will be encouraged and assisted to develop FGDC-compliant metadata to document their data. This is a necessary step before this data can be listed on FGDC-compliant geospatial clearinghouses and is consistent with the Nebraska GIS Steering Committee policy on metadata. "To preserve the public's investment in geospatial databases and to facilitate data sharing, public agencies should document new geospatial data it collects or produces, either directly or indirectly, with metadata compliant with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (data describing the data). Systematic efforts should also be made to develop metadata for existing legacy geospatial data, as time and resources allow." — adopted 3/9/00. Within the limits of available resources, the staff of UNL Libraries, the staff of Conservation and Survey Division UNL and the Coordinator for the Nebraska GIS Steering Committee will assist agencies to develop metadata.

5) Agencies with geospatial data, which has been documented with FGDC-compliant metadata, should be encouraged to list that data in the enterprise Nebraska geospatial data clearinghouse by adding the metadata to the clearinghouse catalog. This work would be conducted primarily by the staff of NDNR (as time and resources permit), with assistance from the Coordinator for the Nebraska GIS Steering Committee.

Longer-term institutional structures and policies

6) As resources become available, it is recommended that the Department of Natural Resources and the GIS Steering Committee work together to enhance the Nebraska geospatial data clearinghouse/center and provide a broader range of data access and support services for the enterprise-wide Nebraska GIS user community.

7) For most GIS applications, it is very helpful if users can have ready access to the best available geospatial data. As the use of GIS-related technologies continues to grow across a broad range of state, local and federal agencies, and the private sector, there is a growing demand for reliable, timely access to the geospatial data that is developed and maintained by a variety of agencies. For applications related to public safety, emergency/disaster response or homeland security, it is vitally important to have ready access to the most current and accurate geospatial data available, that the data be maintained in a manner such that it can be rapidly integrated with data from multiple sources, and that the online access service is reliable in times of an emergency. Many states have found that state geospatial data access and support centers, designed to support the enterprise, are an efficient, reliable means to

provide these specialized services of on-going geospatial data integration and online distribution. In developing an enterprise Nebraska geospatial service center, the following services and/or characteristics should considered:

Recommended Services

a). On-line Catalog and Data Access Point. An enterprise geospatial data center should develop and maintain a Nebraska geo-portal through which users could search for and gain online access to a wide range of existing Nebraska-related geospatial data from multiple agencies (state, local, federal, and private). Data access services should be structured to provide the flexibility of either housing data directly on the center's servers or providing online access via hyperlinks to data residing on other agencies' servers. An enterprise geospatial data center could also provide an efficient avenue for investing in the secure and reliable information architecture necessary to insure ready access to critical geospatial information in times of natural disasters or other emergencies.

b). Help Desk. An enterprise geospatial data center should be structured to provide users with an initial single contact point for assistance in obtaining the most recent versions of a variety of dynamic geospatial databases and a first avenue of inquiry for basic questions related to those databases. Consequently, the data center personnel could relieve the skilled personnel in those agencies that are directly responsible for developing and maintaining these dynamic geospatial databases from the necessity of responding directly to many common day-to-day questions and requests related to those databases.

c). Data Integration. Databases developed by multiple agencies frequently require at least some manipulation before they can be integrated with other datasets. In some cases this manipulation may involve patching together several similar datasets from multiple jurisdictions to form a statewide dataset (i.e. street centerlines/addresses) or inserting a new update from one area into a larger statewide dataset. In other cases, this data manipulation may involve changing several datasets to common map projections or scales. Providing many of these data integration services through a data center would result in increased efficiency and accuracy in that these same data manipulations would be performed once by skilled technicians, instead of by the multiple users of the data, with varying levels of knowledge and skills. In emergency situations, this on-going data integration service could save critical analysis and response time.

d). Interactive Internet Mapping. Internet mapping is a rapidly growing trend in GIS software and applications development. Internet mapping applications go beyond using the power of the Internet to just locate and download existing geospatial databases. Internet mapping technology provides the ability to graphically display, combine and analyze geospatial data remotely. This evolution of GIS technology is having the effect of moving GIS applications from just the desktops of central office technical personnel, to putting these powerful tools in the hands of personnel in agency field offices and in the hands of the general public via the Internet.

However, the application of Internet mapping technology requires an additional layer of technical skills, software, and hardware, in addition to the traditional GIS requirements. The provision of this service within the context of a broader geospatial data center would provide an efficient means for multiple government agencies to transition into this relatively new evolution in the technology. Providing this service through an enterprise data center would provide the opportunity for the multiple agencies, either with existing GIS capabilities or not,

to explore the applications of this new technology without the necessity of their agency making substantial up-front investments in staff training and additional software and hardware purchases.

e). Technical Assistance. Significant public resources could be saved if GIS technical assistance was available to help guide state and local public entities in planning for and making public investments in GIS technology. An enterprise geospatial data center would be a logical place to provide such assistance. At the current time, policy makers and administrators, at both the state and local level, are called upon to make public investment decisions related to the development and/or procurement of GIS data, hardware and software, and technical personnel, for which they have little or no experience. Absent that experience, it is relatively easy to make GIS-related investment decisions that can have costly long-term negative consequences. At the present time, there is no entity in state government charged with providing this type of GIS-related technical assistance. The nature of this assistance could vary widely. Many state or local agencies would benefit greatly from the availability of a consultant to help them plan an overall multipurpose GIS implementation strategy and to work with vendors on implementation. Technical assistance is needed to help define data needs and help negotiate with vendors for GIS data development to realize the required data quality and compatibility for the widest range of applications and users. The availability of limited technical assistance could also help stretch the capabilities of current agency personnel to develop new application and utilize new software capabilities without extensive additional training.

f). Pooling of resources. Many entities (state, local, federal and private) have need of similar geospatial databases (streams, roads, street addresses, digital photography, etc.). Great efficiencies can be gained, when these entities cooperate in the development and maintenance of geospatial databases needed by multiple entities, instead of developing duplicate or similar databases. In developing the organizational structures related to an enterprise geospatial data center, considerations should be given to incorporating mechanisms to help facilitate the voluntary pooling of resources that is frequently a key to achieving an aggregate level of resources that are necessary for many geospatial data development efforts.

Recommended Organizational Characteristics

g). State Agency – University Collaboration. Many states have found that there are benefits to be gained by developing an enterprise geospatial data center in an operational context that involves a state agency – university collaboration. Universities, in general, have more organizational flexibility and can draw upon a talented pool of students to help staff up to meet temporary project needs and to keep a data center on the cutting edge of technological evolution. University-related enterprises also frequently benefit from very significant price breaks from GIS software vendors. A university connection can also be helpful in drawing upon the education experience and technical expertise of the faculty in support of a technical assistance mission of the data center. On the other hand, a state agency connection can provide a more direct connection to changing state and local policies, priorities, and accountability. Given these potential benefits, opportunities for a collaborative state agency – university geospatial data center should be pursued.

h). Relationship with Nebraska GIS Steering Committee. The Nebraska GIS Steering Committee is the statutorily-defined (§81-2601) intergovernmental entity charged with establishing enterprise-wide GIS policies, priorities, and standards, including "The acquisition, development, maintenance, quality assurance such as quality control standards,

access, ownership, cost recovery, and priorities of data bases". For this reason, it is important for the overall coordination of the GIS enterprise in Nebraska that there be a close, and clearly defined, relationship between a Nebraska enterprise geospatial data center and the Nebraska GIS Steering Committee. As part of this relationship, the GIS Steering Committee should take an on-going, active role in assisting NDNR to explore opportunities for partnerships and collaboration as a means to enhance the services available through the Nebraska geospatial data center.

i). Enterprise Service Focus. If a geospatial data center is to be successful in providing the state's overall GIS enterprise with efficient and reliable services, such as on-going geospatial data integration, online data distribution, and technical assistance, it is important that it be designed and structured around an enterprise service focus. If the enterprise is to gain the maximum efficiencies and benefits from such a data center, it is important that the various entities within the enterprise feel that they can rely on these services being consistently available through the data center. Such reliability will minimize the tendency of other entities to develop similar or redundant systems to ensure the availability of these services. While it is probable that such a geospatial data center would be located within the context of an existing agency, policies and/or organizational structures should be considered to help buffer the enterprise data service center from the short-term fluctuations in the host agency's priorities. In a similar vein, to provide these reliable services to the enterprise, it would be important to the host agency that they have at least a minimum level of relatively stable funding to support this enterprise service function.